NATURE MAGAZINE

MARCH 1924

SINGLE COPIES 25 CENTS

Nature Calendar

MARCH

All about us, in the very teeth of winter, we see and hear signs of returning spring.

Winter buds on trees and bushes have become enlarged and swollen.

The First Hint of Spring

"The dry leaves are lifted from the grass,
and so I know
That Nature with her delicate ear hath
caught
The dropping of the velvet foot of
spring."

Warmed by winter's sunshine, the hepatica may begin to bloom, bringing glad convictions of coming spring.

Willow and alder catkins sway in the wind.

Sheltered within dark horn-shaped spathes the malodorous flowers of the skunk cabbage are blooming.

Pussy willows defy the cold winds of March.

The crocus furnishes the first bright touch to the garden.

With this month comes the "tapping of the sugar bush."

Warm days and freezing nights constitute ideal maple sugar weather.

The pupae of the sphinx moth are still wintering deep under the ground.

Egg clusters of the tent caterpillar are conspicuous. Now is the time to exterminate them.

The winter home of the polyphemus moth is a sturdy little structure made of leaves and a continuous thread of silk hundreds and hundreds of feet long.

Cocoons, brought into the house for the winter, are beginning to open.

Strong March winds are pruning the trees.

Do you live in a boulder region? They are the signs that the glacier once visited there.

The chickadee, too, is singing his love song.

By this time the woodchuck has used up nearly all the fat which he had stored up in his body.

There is a flash of blue in the old orchard. A soft, rich song! How joyfully we welcome the bluebirds, harbingers of sunny days!

There will be a general northward migration of the birds this month, but the actual time of their arrival will depend on prevailing weather conditions.

The voice of the grackle, which sounds like a rusty gate swinging on its hinges, announces his arrival.

Are you interested in architecture? If so, watch in secret the construction of a nest by Nature's most skillful builders, the birds.

Short stubby antlers of velvet are already formed on the head of the deer.

Baby barred owls, dressed in fluffy down, huddle together in their nest for warmth.

Red squirrels are mating.

On the sunny side of the woods you may find a flock of migrating robins.

Nature's transportation system is now carrying its biggest loads. It has been estimated that the Mississippi River carries sediment to the gulf at a rate equivalent to fifty trains of fifty cars, each with a shipment of fifty tons, unloading every four minutes.

Your diamond and the lead in your pencil are made of the same thing. The former is pure crystallized carbon, and the latter is amorphos carbon mixed with a small quantity of clay.

Prepared for NATURE MAGAZINE by the Cleveland Museum of Natural History

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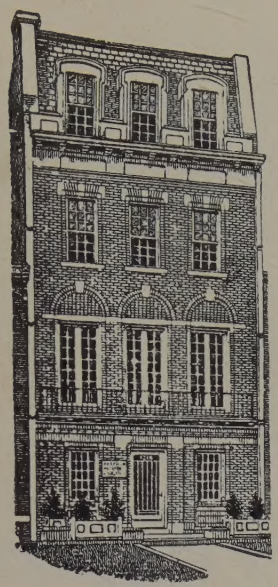

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NATURE MAGAZINE

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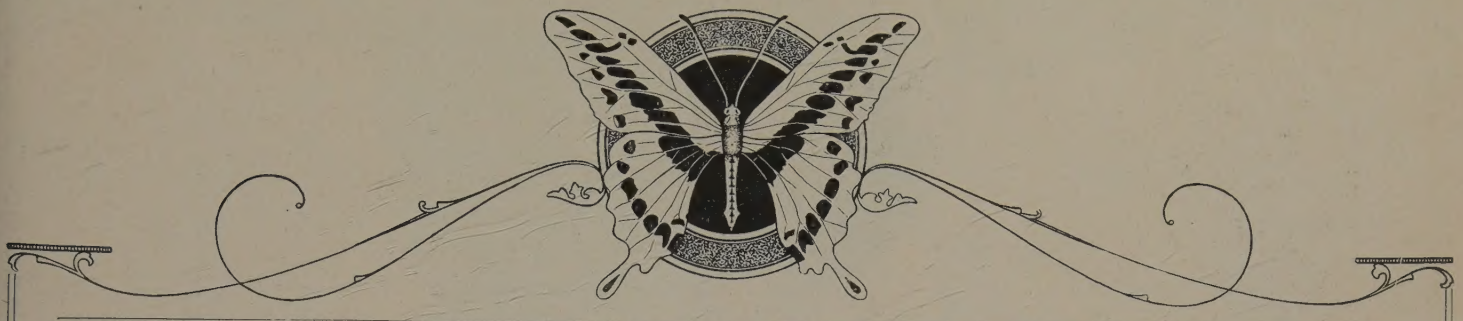

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NATURE MAGAZINE

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Dinty, a Pet Porcupine

By WILLIAM L. and IRENE FINLEY
Of the National Association of Audubon Societies

Photographs by the Authors

IT IS SAFE to say that if we had the "Who's Who" in porcupine history from the beginning up to the present, Dinty would have one of the most unusual biographies of his unappreciated race of rodents. A porcupine seldom gets out of the quiet solitude of his home woods and rarely acquires a Christian name.

In the first place, Dinty began life in an odd way. He just happened to come into existence. His mother died before he was born. She unfortunately had broken her leg in a coyote trap and was killed by the trapper. Dinty was an afterthought. He was born through a Caesarean operation with a pocket knife. It was in the sage and rocks of eastern Oregon. His first breath came as he lay in the hands of the trapper who was surprised at the success of his surgery, and the fact that the round prickly baby lived. So it happened that Dinty's first cradle was the pocket of a coat rocked by the gallop of a horse. He was put in a small wooden box, tagged at the express office, and started off on a long railroad journey that occupied the whole second day of his existence.

DINTY IN A HAPPY MOOD

A porcupine has long gray hair, but underneath his hair from his head to his tail is a full armor of sharp spines which he can erect, pointing out in all directions.

When we met Dinty at the station, his head was down in the corner of his box and his quills up. He knew instinctively this was the correct porcupine way of meeting strangers. When he reached our home, and we looked at his little mouth with two long sharp teeth above and two below like a squirrel, we felt helpless and unfitted when it came to mothering him. We had never had a baby porcupine before, but it

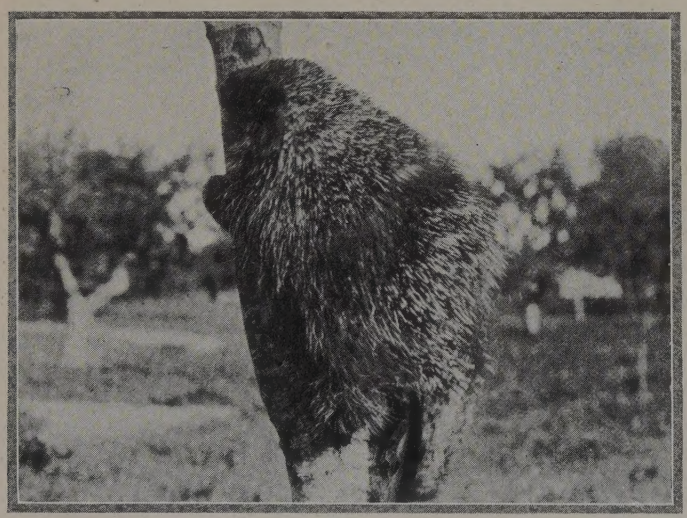
is commonly known that all mammals are nourished from milk glands of the mother, and we were glad to find that Dinty had a taste for milk and a tendency to suck. In taking milk from a nipple and bottle, Dinty reminded us very much of a human baby.

UP A TREE

Some writers claim the quills do not grow in till after birth. Dinty had his when he was born.

He gurgled and cooed. His hungry cry at the time and his lonesome call later on were a plaintive cooing note. In some ways, it was not unlike the cooing of a dove.

Dinty was kept in our study in a box by the fireplace, where he was warm and could be fed frequently. His meals consisted of cream diluted



DINTY WAS AN EXPERT CLIMBER

As he ascended a tree he braced his body by his stiff heavy tail which had short stiff quills on the lower side.

with several parts of warm water and a little sugar added. In two or three weeks, he began to nibble at the stem of a spinach leaf. As the grew older, he enjoyed lettuce, cabbage leaves and raw carrots. Later, as he outgrew his box, he was fond of going out on the lawn and cropping clover. During the summer, he stayed around under some small firs on the hillside below the house.

To understand a porcupine, one should remember the traits that have come down to him in his long line of ancestors. He didn't have the teeth or claws of a cat to fight his enemies; his legs were short and his body heavy, so he couldn't avoid trouble by running. He had, as the ages passed, developed a special kind of armor peculiar to his needs. A simple coat of hair could not prevent him from being torn to pieces when he crouched under the attack of a larger foe, so Mother Nature gradually stiffened and lengthened his hair to pointed quills. For the quill of a porcupine is really a specialized hair growth that is developed as a need of protection and safety. Underneath his skin are broad muscles that elevate or lower his quills by reflex action from his nerve centers. His tail is heavy and also armed with short, stiff

DINTY WAS BASHFUL AT FIRST

The first day he met us he presented his back. He did this instinctively, he had not learned it was impolite.

quills. His eyes are small and, lest some enemy take him unawares, his quills raise and his tail slaps automatically when danger is near.

The point we were most interested in, as far as Dinty was concerned, was whether kindness would counteract his wild instincts. At first he had seemed impolite by turning his back on us, but within a few days he recognized a hand as a friendly symbol which meant dinner and protection. When he learned to crawl out of his box, his next step was to climb up my leg and sit on my lap. He liked to have his back rubbed. Of course, he was safe in knowing that no one would rub it the wrong way. He could be handled by picking him up by the front legs. The under part of his body was unprotected by quills, and there was a place just behind his front legs extending up

to his shoulders that was ticklish and tender and he didn't want any hand to touch.

A wild porcupine is never dangerous unless a person gets near enough for a slap from his spiny tail. The quills are fastened to the body just as hair is. No porcupine can throw his quills as some people think. The points of the quills are sharp and have very tiny recurved barbs. If they penetrate the skin or clothing even lightly, the barbs catch and the quills pull easily out of the porcupine's hide. A porcupine never seeks a fight, but his apparent slowness and helplessness generally lure an enemy too close. The slow-looking porcupine then turns like a flash and kicks quickly with his tail. An unfriendly animal attacking a porcupine generally gets quills in his face that are painful to pull out, and they keep working further in as the animal rubs, worries and frets with torture.

SOME PEOPLE THINK A PORCUPINE IS DANGEROUS

But any wild animal raised from babyhood is human companionship and treated with kindness can be fully trusted. Dinty always kept his quills close down to his body when he was handled.

Dinty enjoyed our companionship. He accepted us as relatives and playmates. He was lonesome and wanted company. He followed us about just as our dog does. In the wild, he would have lived on leaves, tender shoots and the bark of trees, yet I never saw him knaw bark because he had access to a cabbage patch. He liked almost anything we liked, especially fruit. He ate a dozen cherries at a sitting, holding one in his hands with the juice dripping and quickly dropping the pit to pick up another. He ate cantaloupe or waded into a watermelon as eagerly as a boy. He was fond of dry toast, cake or an occasional piece of candy.

Peter, our little dog, is accustomed to meet all sorts of visitors. He has played with bear cubs, bobcat kittens, coyotes, badgers, coons and others. When he walked into the study and saw Dinty shuffling along the floor, he stepped proudly up with an expression that plainly said, "What a round furry ball to play with!" Perhaps it was the delicate odor that reminded one of pineapples that took Peter's fancy. At any rate, Peter nosed right into Dinty's side, but he jerked back. "This little cub with a pin in his side is one of father's jokes," said Peter as he looked up with a side turn of his head. He walked around to smell the other side of the baby, but it,

too, was full of pins. He pawed at the black ball, but the pins stood on end. As a last resort, he put his shoulder down to rub against Dinty, but he got stuck again. Peter couldn't understand. This new visitor looked interesting, but who wants to play with a pincushion.

DINTY COULD BE TRUSTED TO NIBBLE AT YOUR FINGER

He had grown up among human friends and never once did he raise his quills or slap with his tail when petted or treated kindly by a person. In rubbing your hand down his back it felt more like caressing a big bundle of tooth-picks, because his quills lay stiff and flat pointing back on his body. It was, of course, unwise to try to rub him the wrong way or to tousle him as you would a dog.

On the other hand, Dinty took to Peter from the first, perhaps because he looked a little more like a porcupine than we did. Dinty reared up on his hind legs and nosed into Peter's hair with a gentle cooing sound as if he had found something motherlike that he had never before known. It suited Peter to have Dinty scratch and nozzle in the curly hair of his back. It generally ended when Dinty tried to crawl up and sit on Peter, because a stray quill or two were sure to find the way to Peter's skin. Dinty often put his arms around Peter's neck. It was a one-sided love, for Peter merely endured.

There was a certain human interest in Dinty's character that was always appealing. In several reels of motion pictures that I used in one of my lectures, there were great bird colonies along the Texas coast, life along the seashore, packing in the wildest mountains along the Canadian border, and wild moose and elk at the headquarters of the Yellowstone River and on the highest ridges of the Rockies, taken under the most difficult circumstances. While these things may have a certain interest, yet the response was always greatest when Dinty walked awkwardly across the screen

DINTY WAS NEARLY ALL BODY

His legs were so short and so covered with hair they didn't show when he humped up on the ground. He liked to sit up only at dinner time.

JUST A HANDFUL

At this time Dinty was about the size of my fist. His quills were sharp and slender, about a quarter of an inch long and covered by his long hair.

on his heels. Perhaps it was the unusualness of a porcupine climbing into one's lap, or the comedy of Dinty ambling up to Peter with his long-suffering expression at being hugged and kissed by one with whom he could not romp and play. As a moving-picture actor, Dinty won the hearts of the audience. He outplayed many of his wild relatives in the calm, awkward way he did those things you would never expect a porcupine to do.

Dinty's ancestors were night animals. It was natural, therefore, for him to sleep during the day and forage at night. He was at his best toward the dusk of evening. He loped after us along the path in the woods. His gait was like a lumbering little bear. This was his play time. His game was to catch one of us by the leg. If we avoided him, he swung around rapidly, erecting his quills and backing up a few steps. Then shuffling a little from side to side, he whirled again with great rapidity, ran forward, backed up and slapped his tail at an imaginary antagonist. Every time he played meeting a foe, his head would go down and his quills flare out all over his body. When we allowed him to catch us, his quills settled back quickly. He hugged the leg and began climbing with the expression, "I'll not fight you, but I was just showing how to do it."

Many times we have met a wild porcupine in the woods. We generally approach him quietly, but he is always full of suspicion. His tiny eyes, slow movement, dull-witted expression always seem incapable of any real friendship—an impossible pet. However, during the year that Dinty stayed with us, he showed a real affection for us. When we called him, he had a musical and welcome cooing answer. When he was a year old, he weighed about 15 pounds. His sharp incisor teeth could have mutilated a finger, but he showed a gentleness in nibbling a bare hand that would have been too dangerous to trust if we had not known Dinty. With all the hair-trigger disposition of his ancestors in handling their weapons, his friendship for us overcame this wild instinct. Whenever we approached and spoke to him, and with all the handling and petting, he never slapped at us with his tail nor raised his spines in anger or fear after the first few days of our acquaintance. Even his tail, which is his main weapon of defense, we handled without danger. He paid no attention to having a quill or two pulled out as souvenirs for a visitor. The quills, therefore, undoubtedly came free from his body without pain. We admit that he was not as easy a pet to handle as some we have known; yet it was surprising to see how close to his body Dinty could keep his armor so as not to endanger the hand that touched him.

A SAFE WAY TO HANDLE A PORCUPINE

The only comfortable way to handle Dinty was by his front legs. The rest of his anatomy, except his stomach, was too well protected by needle-pointed spines.

Dinty stayed with us a year. Then he began

(Continued on page 170)

Hell-Diver

Agile U-Boat of the Birdland Navy

By HOWARD TAYLOR MIDDLETON

DUE TO the remarkable dexterity of the hell-diver in the water, it is usually impossible to approach it to within camera range, and only when the photographer is so very fortunate as to come upon this queer bird on land, where it is helpless, may intimate portraiture be successfully indulged in.

One bitterly cold and hazy winter's day such a great piece of luck befell us in this wise: Pal (Mrs. Photographic Editor, who is beside me in most wild life adventures—when she is not ahead of me) and the writer were standing at the top of an embankment, looking out over a frost-kissed meadow, spread like a great silver screen below us.

Scanning every nook and corner with our field glasses for sign of a friend in fur or feathers, simultaneously we discerned a miniature object that shone forth with a more brilliant sheen than its surroundings, and, as we watched, it pitched forward with an odd, jerky motion like a tumble-weed touched by a vagrant breeze blowing over a frozen plowed field.

"Hurrah, it's alive!" cried Pal, and holding hands, the better to negotiate the sharp descent, we cautiously approached our mysterious quarry. As we drew quite near, we recognized Mr. Hell-Diver, in his beautiful winter coat of grayish-brown, his vest of silken white, his black stock, worn hind-side before, and his sable skull cap, pulled low—and, all in a moment, we grasped the situation: Failing to migrate ere the cedar-stained waters of the Rancocas turned to black glass, and not being able to "take off" from land, because his pedal extremities are stern paddles rather than legs upon which to run, he was pushing his clumsy way to the nearby smiling pool, a part of which, being fed by bubbling springs, never freezes. Once there, he could either feed upon the succulent seeds of water grasses, snugly harbored until spring should come again to wild life land, or attain the swimming and wing-beating momentum that is a preliminary

HELL-DIVER

Rightly named "Agile U-Boat of the Birdland Navy" because he can actually "go under" between the discharge of a gun and the arrival of the shot.

A FRONT VIEW

This portrait shows to advantage Hell-Diver's white silken vest, his black stock, worn hind-side before, and his sable skull cap, pulled low.

HELL-DIVER IN ACTION

The shutter speed of 1-25 second was far too slow to "freeze" the motions of the wings. It would take at least a 1-350 second exposure to do that successfully. (See illustration of Canada goose.)

necessity to his aerial departure for sunnier climes.

We had two cameras in our equipment when we met Hell-Diver, for the reason that we were journeying to a certain woodland trail, much frequented by forest folk, there to establish our Long-Focus Premo, supported by a flashlight gun, for a try at a night animal self-portrait, and the Graflex was carried also to snap whatever of interest might be seen along the way.

Coming within close-up camera range of our subject, I prepared for a picture, as follows: As the sky was overcast, I set the big 6½ x 8½ Tessar F/4.5 lens in our 4 x 5 Revolving Back Auto Graflex, at F/5.6, the second aperture, and slowed the focal plane shutter to 1/25 second, which is about as slow as it is safe to "shoot" without a tripod (1/10 is safe if you know how). I did this because I was anxious to procure a fully exposed negative, and realizing that the bird would "sit

HELL-DIVER'S HOME-COMING

He sent the spray a-flying in rapture at his return to the environment he loved.

pretty" during exposure, I had no fear of a blurred image.

After two portraits had been procured, front and side views respectively, Pal wanted a pose showing the bird on his feet, and not "sitting on his tail," as she expressed it. Therefore, with her mittened hand beneath his silken waistcoat, Hell-Diver was gently raised to an erect position, which he kindly held for us long enough for a picture. As he was only able to remain in this position by the aid of wildly, flapping wings, the resultant portrait shows him in action. We were unprepared for this; hence the blurred pinions—a 1/25 second exposure is far too slow to correctly portray rapid motion.

"Suppose these pictures we've just taken are under-exposed," worried Pal at this point; "the light is pretty bad. Let's be sure of one good portrait with all guesswork eliminated, shall we?"

"You mean by flashlight?"

"Surely!"

So the Premo was set up upon its tripod, focused, and shutter set at 1/100 second, its maximum speed. Then the loaded Imp flashlight gun was synchronized with the camera by means of a

A FLASHLIGHT PORTRAIT

By this means a fully-timed picture can be had regardless of weather conditions, by day or night.

rubber tube, and held in my hand, slightly above and back of the lens. With the pulling of the trigger, a flare of white light sprang up from the pan of the gun, and Hell-Diver flinched—he was not accustomed to such an elaborate display of fireworks in the daytime. However, that did not trouble us, for we knew his image to be faithfully impressed upon the film, prior to his frightened action, due to the extremely rapid magnesium powder in the gun.

It was only a few yards to the smiling pool, and suddenly it seemed to occur to Hell-Diver that he had spent quite time enough in photographic pur-

MALLARD DRAKE

The most common of all the wild duck tribe. Picture taken along the Rancocas in Southern New Jersey in Winter.

suits, so, with gleaming breast to earth, and paddles pushing out valiantly behind, he very soon covered the remaining distance.

In anticipation of his embarkation, I speeded up the Graflex shutter to 1/110 second, and opened the lens wide—F/4.5. The light was gradually growing stronger, but it was still hazy, and while I yearned to "shoot" fast enough to stop motion in the event of an active launching, I feared underexposure, too. The instant Hell-Diver slid into

BLACK DUCKS

Traitors to their wild brethren—live decoys on Barnegat Bay. look like real ducks.

the smiling pool, he became saturated with ecstasy as well as water. With many a dive and skitter, he sent the spray a-flying in rapture at his homecoming to the environment he loved. Just as this gymnastic performance was being recorded by the Graflex, the sun showed her face through the dissolving mist curtain, bathing the scene in mellow splendor.

SPRIG OR PIN-TAILS

The least talkative of all ducks. Their cry is confined to a very low quack heard only at night.

For our final picture, we waited patiently until Hell-Diver, fatigued at last with his exertions, climbed at an awkward pace up the bank of the pool and began to preen his feathers with his beak. As these ablutions took place within the shadow of a willow, and were accompanied by rapid movements of the bird's head and neck, we feared a blurred image this time most of all. But a wide-open lens, a shutter speed of 1/110 second, and a Kodak Super-Speed Cut Film solved the problem in splendid fashion.

As Hell-Diver is so often mistaken for a duck, I submit, in addition to the portrait series of this feathered submarine, a number of pictures showing other water fowl, by way of comparison.

CANADA GOOSE

A comparison of this action portrait of a Canada goose with that of "Hell-Diver in Action," demonstrates the difference between a 1-25 second and 1-350 second exposure.

The photographer should remember that it takes only half the exposure to clearly portray far distant objects, under an open sky when the sun is brightly shining, that is required for close-up views or portraits.

This is an important thing to know, because if you have been getting good pictures of far landscapes and bad ones of your close friends, you may be wondering where the trouble lies.

When picturing your friends, be careful to see that no discordant note intrudes to mar the artistry of your handiwork. For instance, I once saw a portrait of a beautiful society girl transformed by the photographer into a ludicrous caricature because of the top of a palm tree in the distance, seeming to rise from the lady's head, thus changing her into an Indian Princess, adorned in both aboriginal head-dress and modern evening gown—an incongruous combination indeed.

From Boll to Bolt

By J. S. WANNAMAKER
President of the American Cotton Association

MYTHOLOGY tells us that Hercules, to show his love for Omphale, once sat at her feet, took a spindle and spun a thread. Immediately his mythological fellows declared him humiliated in the sight of men. Spinning was the business of women. But if Hercules could stand today in a great mill, watching the intricate and almost human machines engaged in transforming the snowy product of our southern fields into clothes for three-quarters of the world, and making a multitude of articles for our daily use, he would feel a goodly pride at having been one of the early, if mythical, spinners of cotton.

Historically, from the days when crude fibers were woven into beautiful designs down to the perfections of today, cotton has a story of absorbing interest. Economically it influenced the industrial age and walked hand in hand with invention and advancing civilization. It stands high among the products of the soil that we turn to our daily use. It is an international fiber in production, manufacture and trade. It ties nations together in commerce, love of beauty and progress.

Many centuries ago cotton was drawn into thread and woven into fabric. We find these in ancient tombs. They are the products of civilizations about which we know little except that they gave us the ideas of weave and design that we use today. Exactly the origin of cotton in discovery and development is a mystery. Records do not go far enough back and we must guess much. Some say that the culture started in Asia and came to the New World in days when the geography of the Pacific Ocean was different. On the other hand, cotton grew in a wild state in various parts of the world and may have been developed in different places at the same time. There is a wealth of evidence, however, that the early use in many sections resulted from contact with India. In other sections, entirely removed from this touch, wool, flax and silk were developed before cotton.

Cotton is a seed plant. We find it growing either as a shrub or a tree with heights varying from 3 to 20 feet. For the most part the plant lives one year, although it is found having a two-year span of life and in some cases a continuous life. Usually the stem is erect and the plant not unlike a fir tree, tapering up from wider lower branches. The leaves are heart-shaped. In some varieties the entire plant is covered with hair. These small furry coverings are found on the leaves, stems, branches, pods and seeds of the plant. The flowers are conspicuous and vary in color, being white, brownish-red, purple, rose-colored or yellow.

GREEN COTTON BOLL

These nut-like bolls have reached their full growth and are ready to open into fleecy fruit.

The wind plays an important part in spreading the numerous down-covered seeds when the plant is not systematically cultivated. The root penetrates deep into the soil. The cotton plant itself responds readily to differences in climate, soil and methods of growing. This accounts for the almost innumerable varieties known to the cotton grower, although the botanist recognizes only a few types.

If you wish to go into the business of raising cotton, select a warm

climate where there is plenty of moisture in the soil and in the air. Then you must plow and harrow, oil up your seed-planting machine and set it at work dropping the seed thickly in the furrow. In five to eight days the tiny plants will begin to appear. By now it is April or May, and you have a delicate task ahead. You have got to thin out the plants so that the best one can grow.

You want sunny days with occasional gentle showers which will bathe your growing crop of plants. About the middle of June your field will be beautiful with brilliant flowers. Two months later the snowy bolls will be ready for picking. The appearance of your field will, perhaps, allow you to forgive the fantastic story that Sir John de Mandeville told when he returned from fourteenth century explorations and said that he saw and ate of "a maner of Fruyt . . . with inne a lyttle Best, in Flesche, in Bon and Blode, as though it were a lyttle Lomb with outen Wolle."

In your field you may grow short staple Sea Island, Upland, Deo, Peruvian, Egyptian, American-Egyptian or some other kind of cotton. This will have to be decided by the locality. The Sea Island comes from the West Indies, where Columbus found it, and grows best in a hot and humid climate. It responds to irrigation, however, and is successfully grown in the southern United States. The plant produces a long, silky fiber, growing as high as 8 feet. When it is grown in island state it has thus far escaped the boll weevil, being protected by the sea. Indian cotton is of the shrubby type, easily crossed with others. The "vine cotton" of Cuba belongs to this family. The Upland cotton is marked by the hairy covering, and this interesting peculiarity is found in many varieties of American cotton. Mexican cotton is similar, and Deo comes from the cotton trees, growing generally along the seaboard of the Indian Ocean. In bloom it is very beautiful with its white, brownish or purply red flowers.

COMBED COTTON FIBERS

From the top down are Sea Island, Egyptian (Pima), Meade, Durango, Acala and Lone Star cottons.

While it is growing the cotton has several enemies waiting about to pounce upon it. The worst of these is the boll weevil, "billion dollar bandit" of the cotton belt. This ugly little blackish-gray bug, not unlike the pea weevil in appearance, but with a long nose and dangling legs, has caused the loss of a billion and one-half dollars in the last five years. He has destroyed nearly one-third of the cotton crop of the United States in the past nine years. He costs every man, women and child in the country about $2.50 a year. He makes cotton shortages like the present one, sending prices soaring, impoverishing producers, closing mills and throwing thousands out of employment.

Thirty-one years ago the boll weevil crossed the Rio Grande River, invading the United States near Brownsville, Texas. Gradually migrating eastward about 60 to 100 miles every year, he has infested practically the entire cotton belt. Only a limited territory in northern Virginia, Tennessee and Missouri has escaped him.

The boll weevil dislikes cold weather and in winter hibernates in the shelter of barns, haystacks, hedgerows, stumps and thickets. The spring brings the young cotton plants through the ground, and the weevil makes his first attack on the small bud between the first two leaves of the young plant. He eats the blooms as they develop and deposits eggs inside the formation. A pair of weevils invading a cotton field in May, and left undisturbed for four months, have a progeny of twelve million. The insect attacks the young bolls, and later in the season he takes advantage of a rainy spell to attack the maturer bolls through the softened hulls.

Late July and August are the days of the weevils' migration. He spreads destruction. A field kept free from the scourge may be infested over night and the crop destroyed. Calcium arsenate has been discovered to poison the bug. It is applied in liquid form or as dry powder. It is, however, an uphill battle. The American Cotton Association has inaugurated a southwide boll weevil control campaign, setting up demonstration farms and teaching growers to defend their crop. Extension of this work is planned in the current year.

The Boll Weevil Control Campaign for 1924 provides for the establishment of five thousand cotton demonstration farms, distributed over eleven cotton states, or an average of six farms, geographically located, in each of the 805 boll-weevil infested cotton-growing counties. Four thousand of these farms will be operated by selected white farmers, and one thousand by negro farmers selected in cooperation with Tuskegee Institute, Tuskegee, Alabama.

THE FLEECY COTTON BOLL
A handful of soft fibers which link nations together in commerce and love of beauty.

LEAF AND FLOWER OF THE COTTON PLANT
White, brownish-red, purple, rose-colored or yellow flowers give brilliant beauty to the June cotton field.

The 933 cotton demonstration farms operated this year under the supervision of the American Cotton Association for boll-weevil control have shown the most gratifying results and clearly indicate that the application of the practical methods of culture and poison devised and advocated will result in holding the weevils in check and producing profitable yields of cotton.

Let us return for a moment to the history of the use of cotton. We will have to leave the questions of its ancient origin to interesting guesswork. We do know, however, that our civilization owes to India the first principles of modern spinning and weaving. The conquering Alexander brought cotton to Asia Minor. In the second century it was first known on the soil of Europe when it was grown near Elis, Greece. Barcelona in Spain, Ulm in Germany and Venice in Italy flourished in their time as cotton centers. Cotton goods were imported into England in the fourteenth century.

The history of cotton production in the United States is the history of millions of people. It is the story of pioneers who created colonies, fought savage tribes and laid out plantations. Fourteen years after the colonists settled at Jamestown, cotton was planted at Newport

News. Glowing accounts were sent back to England of the new colony's ability to raise this valuable crop. The first settlers in the Carolinas began cultivation, and the governor was ordered to accept cotton in payment of rents. With each settlement in the South were more plantations. Mississippi and Louisiana followed as cotton-producing states, then Georgia, Florida, Alabama, Tennessee, Missouri, Arkansas, Texas, Oklahoma, Arizona and California.

WAITING AT THE COTTON GIN

Grower's wagons loaded with seed cotton awaiting their turn. Each wagon contains about enough seed cotton to make a 500-pound bale.

PRODUCT OF THE GIN

Baled cotton from which the seeds have been separated but which must be compressed into the market bales.

The greatest early drawback was the difficulty of separating the lint from the seeds. It was first done by hand. In the evening whole families would sit about the planter's table, picking and pulling at cotton until bedtime. Most of the growers manufactured their own cloth at first, mixing it with wool. By the close of the first century of colonization, however, one-fifth of the people of the South were clothed with goods made at least partly from cotton.

Various strange machines were made to separate the clinging seeds. In 1793, however, came Eli Whitney's gin, using saws to strip away the lint. What Arkwright, Crompton, Cartwright and others had been doing in England for manufacture, Whitney did for production. He broke the barrier to progress. Cotton production started to surge forward, to be blocked only by war, weather and weevil in its contribution to the progress of the new country.

The early product of the American cotton plantations was coarse. It was not equal to the finer cotton of India, Egypt and the West Indies. It would not make the brocades, muslins and calicos that delighted the Old World. It was like the hardy pioneers of the new country. The settlers had brought with them their knowledge of spinning and weaving and they paid little

attention to the attempts on the part of England to discourage manufacturing. The country was taking the necessary step before political independence and becoming economically independent. There was an outcry against the wearing of fine clothes imported from the other side. Home manufacture was encouraged and production leaped forward.

Finally the blow was struck for liberty. Development and use of American cotton was a leading patriotic activity. Wives and mothers and sisters met at spinning circles instead of bridge parties. Bulwarked behind bales of cotton, a handful of men fought off the enemy in the southern campaign. Great progress in manufacture had been made abroad, and the war was followed by a boom in the new country. Washington was inaugurated in garments made in the new democracy. "Buy at home" became the slogan.

In 1790 the first successful cotton mill was started in Pawtucket, Rhode Island, by Samuel Slater. Within a generation more than 100 mills had been established. Cotton production grew. Mexican cotton was introduced, improving the quality of the output, and in 1829 the first railroad was built in a cotton state. During the decade beginning with 1840 prices of cotton slumped, booming mill building and foreshadowing a greater demand.

All this time cotton had been paving the way for one of the saddest pages in American history—the Civil War. The negro was cotton's slave and public opinion came to demand that he be freed. So the war broke. Famine in cotton followed, and foreign nations sought to encourage the growing of cotton elsewhere without marked success. After the war came a period of renewed energy. Cotton exchanges were organized and system was brought into the industry. From then on the cotton crop of the United States battled drought, in-

PICKING CROP OF UPLAND COTTON

Workers in field gathering bolls of type of cotton which plays important part in the output of the United States.

AT WORK IN THE COTTON FIELD

The bolls are gathered by hand from the plants, placed in sacks carried by the workers and loaded for the cotton gin.

sect and flood, producing bumper crops and lean crops.

The southern United States has long controlled the raw cotton industry of the world. Radical change must come, however. The old system of production has broken down. The boll weevil and labor problems mean a new era. The negro is leaving the farm because he is actually hungry. The white man deserts the farm because he is hungry for the better things of life.

WELL-FRUITED COTTON PLANTS

Two trees with their bolls fully opened ready for the field workers to gather them for market.

Efficient management and intensive methods of growing must prevail in the cotton belt. A self-sustaining agriculture is vital. Cheap cotton, marketed at prices less than the cost of production, is no longer possible. Growing at the expense of the ordinary comforts and the illiteracy of the rural citizenship is out of tune with civilized progress. The only answer is a two-plank program. The first is growing on the farm enough food and feed crops to make it sustain itself, and enough acreage in the money crop of cotton to meet the legitimate demands of consumption. The second is cooperative marketing, giving the growers cost of production and a fair and reasonable profit.

(Continued on page 182)

ON ITS WAY TO MARKET AND MILL

The product of the fields ready for shipment to be transformed to serve us as fabric or in many other ways.

Tornadoes—The Funnel Clouds

By GAYLE PICKWELL

Department of Zoology, Northwestern University

TORNADOES would be nearer funnels in appearance if funnels had a longer, narrower spout and a smaller top. But, even as it is, tornadoes are more closely fitted by a simile to funnels than to any other household implement, except that words can never describe them accurately. Except also that no comparison is adequate to give a second-hand edition similar to the first-hand, awe-struck, panic-filled, whirligig impression. No other funnel-like object gives the visual, auditory, and mental hysteria that results from the near approach of the funnel-like cloud.

Now a tornado is a cloud: an upright, revolving, roaring, devastating cloud. But it is not a typhoon, a monsoon or a hurricane. Above all it is not a "cyclone." Typhoons and monsoons are storms covering large areas, hundreds of miles in diameter, and they give rise to straight winds only. The winds of a tornado have a violent rotary motion. The word "cyclone" refers, correctly, to the great storm areas which pass, week by week, across the United States.

The weather man reports a storm; that storm is the result of the approach of a cyclone covering, mayhap, the entire Mississippi Valley or the Pacific Coast or the Atlantic. A tornado at its largest will be less than 1,000 feet wide at the base.

Whenever the barometer falls a cyclone is approaching. A tornado may accompany it, provided the cyclone is of tornado character; provided the locality is tornado territory; above all, provided it is tornado season.

Tornadoes, like roasting ears, come in season. But that season, unlike the date for roasting ears and contrary to the general notion, is not July and August! It is not even June, the sultry month of summer, but is limited, strangely and fortunately, to March, April and May. April is the month of bumper tornado crops. A later variety flourishes in May and, rarely, like fall-blooming roses (odious as such a simile may be), a few spring up in late August and September. The hot days of summer are not producers of the funnel clouds.

Photographs by Gayle Pickwell

A NEBRASKA FUNNEL CLOUD

The upper portion was photographed first and the lower immediately afterward. The cloud was too near to be focused on a single negative. Note the long, curved spout, the bend near the foot and the characteristic boiling dust cloud at the base.

The prevailing idea that tornadoes occur during midsummer has crept into textbooks, but one does not need statistics to disprove it. Your daily paper, next spring, will assuredly carry accounts of tornadoes. Beginning early in March will come reports from Texas and Mississippi, and by late May the Dakotas and Minnesota will have been visited. With the exception of one, all the tornadoes illustrating this article occurred in April or May. And statistics,

if you need them, show that nearly 80 per cent take form in the first three months of spring.

Clouds and seasons have a definite relationship. Such is the case with the funnel cloud. Different periods of the same day will produce different clouds. The tornado comes usually in the late afternoon or the early evening. The cloud of the first two illustrations of this account was photographed at 6.00 p.m., the last three about 5.00 p.m. The hours from 3.00 p.m. to 10.00 p.m. will include all of them.

Tornadoes are restricted as to territory. They seldom occur outside the United States. And in the United States the Mississippi Valley reserves them mainly for itself. Texas, Oklahoma, Kansas and Missouri run neck and neck for funnel-cloud honors. Nebraska easily takes second place. And, closely in order, come Mississippi, Alabama, Iowa, Illinois, the Dakotas and Minnesota. Outside this region the whirling cloud seldom strikes. It is unknown in California. New England is never visited.

Photograph by Dr. Chester Forrey

A TORNADO OF NORTH DAKOTA

Tornadoes are funnel-like only in that they are cylindrical and taper to a foot. They are, however, definite, unmistakable, whirling clouds usually less than 1,000 feet broad at the base.

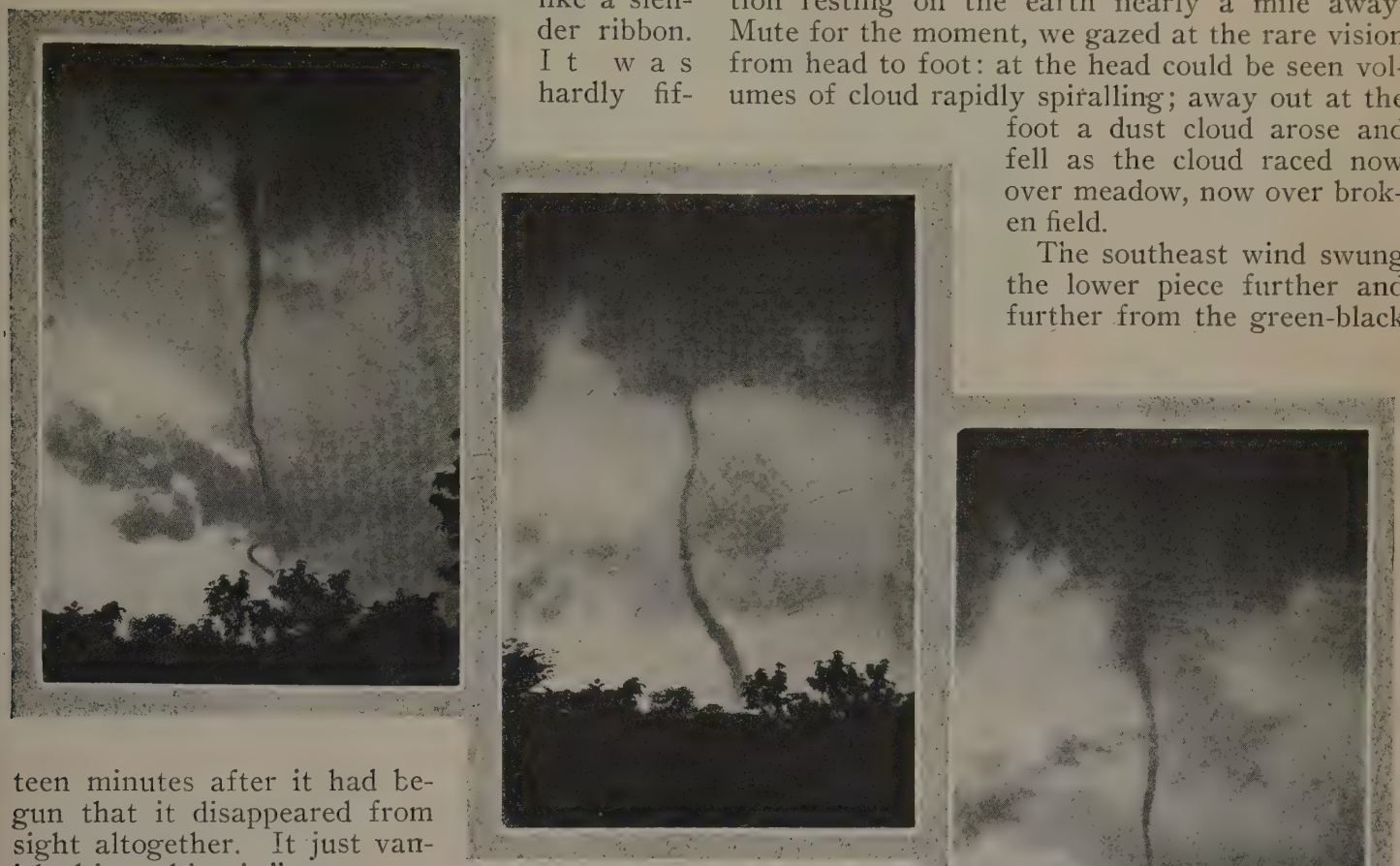
Just as the Mississippi Valley has more tornadoes than other parts of the United States, so some of the states of the valley have a longer list than others, and local, restricted portions of those states will be swept time and again by these "little" scourges of the air. I recall that near a small town but 10 miles west of my old home farm in Nebraska, three tornadoes have passed through the same strip in a short lifetime. A funnel cloud tore a strip through Omaha on Easter Sunday, March 23, 1913. A second cloud razed buildings near the same locality on April 6, 1919. And a third, one of those of the belated autumn crop, passed through Council Bluffs (just across the river from Omaha), in October, 1923. Perhaps the topography of the land, the presence of valleys or rivers, leads these destructive clouds again and again down the same ill-fated path.

If it is March, or April, or May, and you are in the Mississippi Valley and have had a few days of warm, quiet weather and this is interrupted by squalls and thunderstorms, then you have ideal tornado conditions. The sky will be filled with scattered cumulo-nimbus clouds—the thunderheads—scud will scurry rapidly beneath and occasional dashes of rain will fall. The dashes of rain become big splashes of rain, then hail comes in big scattering pellets, the scattered pellets become collected balls and, if you are watching, you may see a big, green-black thunderhead rolled up in violent agitation. One end tapers and drops, reaches the earth, and starts a mad career of destruction—there you have the funnel cloud.

Mr. R. V. Heidbreder, who took the three photographs of the Missouri tornado, says: "The day (of the tornado), dawned bright and clear, but, as the sun rose higher, it grew sultry, and about noon, what little breeze there was stirring died away. It was not before 2 o'clock that it began to cloud up in the west and northwest. The clouds came up rapidly, and about 3.30 we had one of those sudden summer showers with plenty of thunder and lightning. It lasted about an hour and then it seemed as if it were about to clear up; but not for long, because a second cloud followed the first, and before many minutes the second deluge of water came down.

"At first it was only water that fell, but soon a few kernels of hail came. The kernels came faster and faster, and after a while it ceased raining altogether and hailed for all it was worth. Some of the hailstones were as large as the proverbial goose eggs. The sun came out, and someone went outside to gather some of the largest chunks of ice. On looking toward the west a very much agitated cloud was seen. It was rolling and whirling for all it was worth. Then it seemed that a huge arm was slowly descending from the sky. It bore little resemblance to a funnel and seemed very much

alive. It writhed and twisted about until it touched the ground. No sooner had it come into contact with the earth than it seemed to grow narrower and narrower and narrower until it looked like a slender ribbon. It was hardly fifteen minutes after it had begun that it disappeared from sight altogether. It just vanished into thin air."



TORNADO SEQUENCE—IN MISSOURI

These pictures, taken in rapid succession, show the evolution of a tornado from a nearly formless cloud to a writhing, sharply defined ribbon. All funnel clouds are derived from a characteristic, black cumulo-nimbus cloud.

Photographs by R. V. Heidbreder

That remarkable tornado shown in the first two illustrations came during weather very similar to that described by Mr. Heidbreder. The day had been alternately cloudy and clear, with an occasional small splash of rain. The day was not sultry, for it was too early in the spring (April 6), but was warm and pleasant. Toward sundown a very heavy green-black cloud rolled over from the southwest and began to hail. The hail came gently at first and then in great, hard balls. For several minutes this continued, then came a cessation and the sun burst forth from its low position in the west, illuminating the ragged cumuli about it to a dazzling white but making the green-black cloud, now nearly over our heads, even more ominous than before. Someone glanced up to discover a rainbow and discovered—a tornado.

Unmistakable even to us who had never seen one before, the funnel cloud hung as a great thick rope in a long, loose arch from the cloud above. Black at its upper end, it shaded out until the lower lengths were the color of escaping steam. A southeast wind had swung the foot away to the west of the mother cloud so that the head of the funnel was directly above our heads and the portion resting on the earth nearly a mile away. Mute for the moment, we gazed at the rare vision from head to foot: at the head could be seen volumes of cloud rapidly spiralling; away out at the foot a dust cloud arose and fell as the cloud raced now over meadow, now over broken field.

The southeast wind swung the lower piece further and further from the green-black cloud which was traveling northeastward, and as it swung it lengthened. Loops appeared in the funnel spout. The loops became coils and with this added stress the tornado broke, a small portion lingered for a moment writhing beneath the cloud above, then disappeared. The dust cloud on the earth below continued its mad gyrations for a moment more and then disappeared. The tornado had come and gone! From the green-black cloud now came a torrent of rain.

These narratives fit nearly every tornado. The order of events is usually the same: warm day, thundershowers in the afternoon or evening, violent hail, the tornado appears and rain follows.

The exact cause of tornadoes is a mooted question. The two most logical explanations are

these: During the passage of a storm area of spring it often happens that the wind, blowing violently from one direction, will change in short order and blow just as violently from the other. At the "wind shift line" there are enormous eddies and whirls of air. Occasionally these become sufficiently powerful to form the funnel cloud.

Again, during the squalls of spring the sun continues to heat the surface during the moments of fair weather. This sets up a strong local convection (rising of air), from the surface which unites with that causing the squalls above and the two combine to form the whirling funnel from the base of the rising cumulo-nimbus.

Photos by Wm. A. Wood

AT FIVE MILES A FUNNEL CLOUD IS A ROPE

These views are of the same tornado as the first two here shown. These display the loops and the rolling thunderhead from which the funnel drops.

Every middle-westerner can tell awe-inspiring tales of the ruin and desolation wrought by tornadoes, of their terrible destructive power; but the cause of this havoc is not clearly understood. Certain it is there must be a terrific wind, and some authorities have estimated that that on the outer walls of the funnel may travel at from 300 to 500 miles per hour. In the very center there may be a partial vacuum which bursts open all objects which withstand the outer winds.

As a whole the tornado travels at a tremendous rate also. The cloud of the first illustrations was not ten minutes in duration, but it carried devastation to a strip more than 7 miles long in that time. The funnel never travels less than 40 miles per hour and often more than 60. This estimate was verified in an interesting way last May. A tornado descended near Clonmel, Kansas, and passing through the town stopped a clock at 8.55 p.m. Thirty miles further it struck Wichita, Kansas, and stopped another clock at 9.30 p.m. It had traveled 30 miles in thirty-five minutes!

There is but little to say concerning protection against tornadoes except that the individual danger is not great even in the territories of greatest frequency, for the paths are never wide. Greatest havoc results when a large city is in the path, for destruction is complete wherever the cloud touches. Farmers of the tornado region have "cyclone" cellars and caves, but one may be caught in the field far from caves. It is hardly possible to outrun the cloud, but it is possible to sidestep it. Knowing that they usually travel from southwest to northeast one may conduct his steps accordingly.

It must be admitted that the near approach of this wonderful cloud causes such a panic that few sane ideas are ever entertained, and there are some, to be sure, who become so thrilled at so rare a vision that the thought of danger never interrupts their observations. I was so possessed with the idea of securing the photographs (Figs. 1 and 2) that nothing could divert me, though a panic-stricken family was about, the head of the funnel directly over me, and the foot squarely in line to wipe us off the face of the earth. Luckily the foot swerved to the west and the photographs were saved!

Clouds, on the whole, are such lovely objects of nature that it is to be regretted that so grewsome a subject as a tornado must be classed with them. But tornadoes make up in interest what they lack in beauty and add, occasionally, little touches of humanity in their mad and freakish careers of destruction. Witness the story of Mrs. Lenz, who barely escaped losing her life in the Nebraska tornado, the photographs of which, taken by the writer, appear in the earlier part of this article.

Mrs. Lenz, a young farmer's wife, had placed her sleeping baby upon a bed and had gone out, among the scattering pellets of hail, to look after some baby chicks. Her husband was at a distant pasture watering his cattle. Mrs. Lenz noticed the peculiar cloud, dangling like a thick rope from the sky, heard the roaring, guessed the awful import and rushed to the house and in to the baby. She then threw herself upon the bed clasping the child. The house, which happened to be directly in the path of the tornado, was completely demolished.

Two hours later the frantic husband found his wife beneath a pile of debris in his uprooted orchard a hundred yards from where the house had stood. The woman was unconscious but, aside from a few bruises, unhurt. The baby was fast asleep, held tightly in the mother's arms.

Fungus Diseases That Destroy Insects

By PAUL GRISWOLD HOWES
Assistant Curator, Bruce Memorial Museum

(Photographs by the Author)

IN the Mississippi Valley there is a disease known as "chinch-bug cholera." It is known in other parts of the country also, but perhaps not so well as there. This is one of the diseases that benefits man, for it attacks only insects that are injurious to his crops. The disease is caused by a parasitic fungus, known scientifically as Sporotrichum globuliferum, and its host is the dreaded destroyer of corn and wheat, the chinch-bug.

It is of great interest and importance that this fungus may be cultivated artificially in the laboratory. It thrives on culture media of different kinds, and may be sent out to farmers in badly infected areas. The method followed is to distribute the bodies of infected insects in the fields, either dead or alive. The disease is then contracted by the healthy bugs and soon spreads over the infected locality, helping to exterminate the pest, if not eliminating it altogether.

Many kinds of insects are subject to these fungus attacks, but it appears to follow that they thrive well only in moist weather. The chinch-bug fungus is probably the only that has been seriously experimented upon and turned to the use of man, but there is no doubt at all that others might be brought under control, and eventually become of enormous benefit to the human race.

Our common house flies are subject to a fungus cholera due to the attack of the species Empusa muscae, which slays them in large numbers in the late summer. Swollen flies are often seen at this time of the year clinging to the walls of kitchens or other greatly frequented places. About the dead or dying insect will be seen a ring of white mould, due to the spores of the plant which have been ejected at maturity. One fly catches it from another, or from free spores in the air, and the disease is really very beneficial as far as man is concerned, in reducing the number of flies.

It should be possible to cultivate this fungus in the laboratory, so that it might be liberated early in the year, and from time to time thereafter, by turning loose infected flies. Here is a valuable piece of work for someone and an accomplishment that should not be very difficult.

In our American tropical forests, and, in fact, in all tropical countries, these fungus diseases of insects are very numerous. The warm humid air is exactly suitable to their growth, and one finds them sprouting on all types of insects. It is proposed by the author to carry on research work along the lines above suggested with tropical species of fungus at the earliest possible opportunity, in hopes of finding something that will be of bene-

VICTIMS OF FUNGUS DISEASES

At the right are two house-flies destroyed by Empusa muscae, a disease that appears in late summer. At the left is a beetle completely engulfed in fungus. (Much enlarged.)

fit. There is a real field here. Ants are quite generally afflicted, but in many cases, one is likely to forget, the plant probably attacks insects that are already dead. Those species that attack the host while it is still alive are the only ones that will lend themselves to economic uses and much careful observation will be necessary on this line.

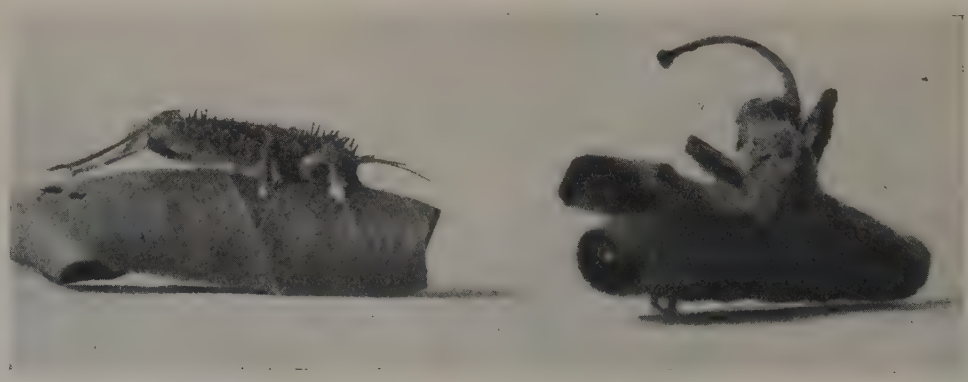
So common are these fungi in the tropics that an entire book has been devoted to them. Some of the species are shown highly magnified in the accompanying illustrations. The portion of the plant that is visible from the exterior is simply the fruit of the organism. The body of the plant consists of very delicate, thread-like processes, that gradually infest the entire abdomen and thorax of the victim, strangling it, and firmly anchoring it, in the end, to the surface of a leaf or other habitat of the insect. The fruit, in the form of a knobbed stalk, or many thread-like projections, at length pushes through the skin of the host and liberates its spores, which, in turn, infect others.

TROPICAL ANT FROM BRITISH GUIANA

This insect shows numerous fruit stalks of the destroyer, which have penetrated the victim in several places.

This is the procedure of fungi in general, and we generally forget that even in our common toadstools or mushrooms, with which everyone is acquainted, the stool is simply the fruit of the real thready plant that grows below the surface.

The big black ant shown in the photograph was found in the forest of British Guiana and was in a mummified condition, owing to the completeness with which the plant had penetrated its victim. It had afterwards dried up, leaving the object as it was found. The final attack of the disease, the onslaught that slays the unfortunate sufferer, must come very rapidly and suddenly, for otherwise, why should we find ants and beetles cemented to the center of leaves that wave about in the slightest breeze? Fungi grow very rapidly anyway, and probably as the diseased creature stops to rest its paining limbs, the deadly threads break loose and set their net from which the insect will never again escape.



PRISONERS OF THE FUNGUS

A cricket and an ant anchored to leaves by the attacking fungus. Note the fruit stalk of the plants. (Much enlarged.)

One of our most destructive insect families is known as the Aphidae, or plant lice. These bugs reproduce by giving birth to their young alive, except at certain times of the year, and a normal mother will bear five or more young in a single day! They suck the juices of a great variety of plants and may often be seen in enormous green or vermilion colonies on golden glow, goldenrod and various fruits and vegetables. They are attacked by many parasites, one of which is a fungus, and this plant rids us of large numbers of aphids during the summer. Properly controlled, it might become of very great importance, as the following preliminary experiment, carried out by the writer, will serve to illustrate:

Some of the infected aphids were taken from plants (nasturtiums in this case) and their bodies were used to inoculate sterilized test tubes of culture media, made from meat infusion, peptone and sodium chloride. These inoculated tubes were allowed to incubate, and excellent growths were secured of the destroying fungus. A box was now prepared in which the temperature could be kept quite warm and the air humid by means of damp earth in the bottom, and very little ventilation was allowed at any time. Into this box infected plants with their colonies of insects were placed, together with the fungus cultures removed from the test tubes. A miniature

(Continued on page 158)

Autobiography of a Rolling Stone

A Tale of the Yellowstone Country

By WILLIAM C. ALDEN, Ph.D.

"WELL, now, doesn't it seem strange, after all these centuries and millenniums, that I should at last find a resting place among the treasures of the famous collections at Washington? I have heard it said that I am rather a remarkable specimen myself, but some say I am a sort of blockhead, a fossil, albeit of very ancient lineage. It is true I was once rather wooden, 'a chip off the old block,' as they say, but as you can see for yourself I am of fine grain.

"I heard one of those vain human beings boasting that his ancestors came over in the Mayflower in 1620—1620, indeed, why to me 'a thousand years are but as yesterday when it is past!' A famous explorer came up the great river, the Missouri, with his party, in 1805, into the Montana country. He was the first white man to view the grandeur of the Great Falls and he went into raptures over them, saying that they far surpassed the famous Falls of the Potomac. He and his party went on through the mountains to the Far West where rolls the vast Pacific. In July, 1806, he came back down my river, the Yellowstone, and carved his name, 'W. Clark,' upon a cliff. They call it Pompey's Pillar now, and travelers passing by stop to wonder at its antiquity. When his party passed that way the prairies teemed with buffalo, and at one place they had to wait for a herd of 80,000 to cross the river before their boats could pass. Now not a single buffalo roams the prairie. But, pshaw, that was not long ago at all. The Indians had been here thousands of years before that, but I had finished my active career ages before the first Redskin set foot on America. I had retired, as it were, before the Great Ice Age, and had settled down to spend my latter days in peace.

"They say I am only a pebble, a stone, and a rolling stone at that. Well, I've gathered no moss, but I have accumulated some experience.

"I was not always a pebble, though that would have been nothing to be ashamed of, I assure you. Come here and look at me. There are those who are skeptical as to my origin, so that I have consented to have some sections cut, and if you will put these under a microscope you will see what once were living tissues. I too have felt the thrill of vital energy surging through my every cell as the warm sun beamed full upon my glorious foliage. My head towered above my fellows; I was a monarch of the forest. In truth, I was a tree.

"Even man who thinks himself lord of all creation could not have looked down on me. It was the refreshing shade of such as me and my fellows that cooled the throbbings of his growing brain. Trees stood before him towers of strength, as pillars in the temple of his God. To gaze upon their placid countenances he stood upon his feet and turned his vision toward the skies. They taught him dignity, uprightness and stability. Like the moun-

WHILE engaged in extended studies of the glacial geology and physiography of the northern Great Plains, I one day picked up a remarkable pebble on an ancient river terrace, about one thousand feet above the present channel of Yellowtone River. It was a smoothly rounded fragment of petrified wood and it seemed to me that if that pebble could talk, it could tell a wonderful story of the changing scenes through which it had passed. I have tried my hand at sketching such a story briefly—with what success the reader can judge.—The Author.

A PEBBLE OF FOSSIL WOOD

Now a pebble, once a tree. "To me a thousand years are but as yesterday when it is past."

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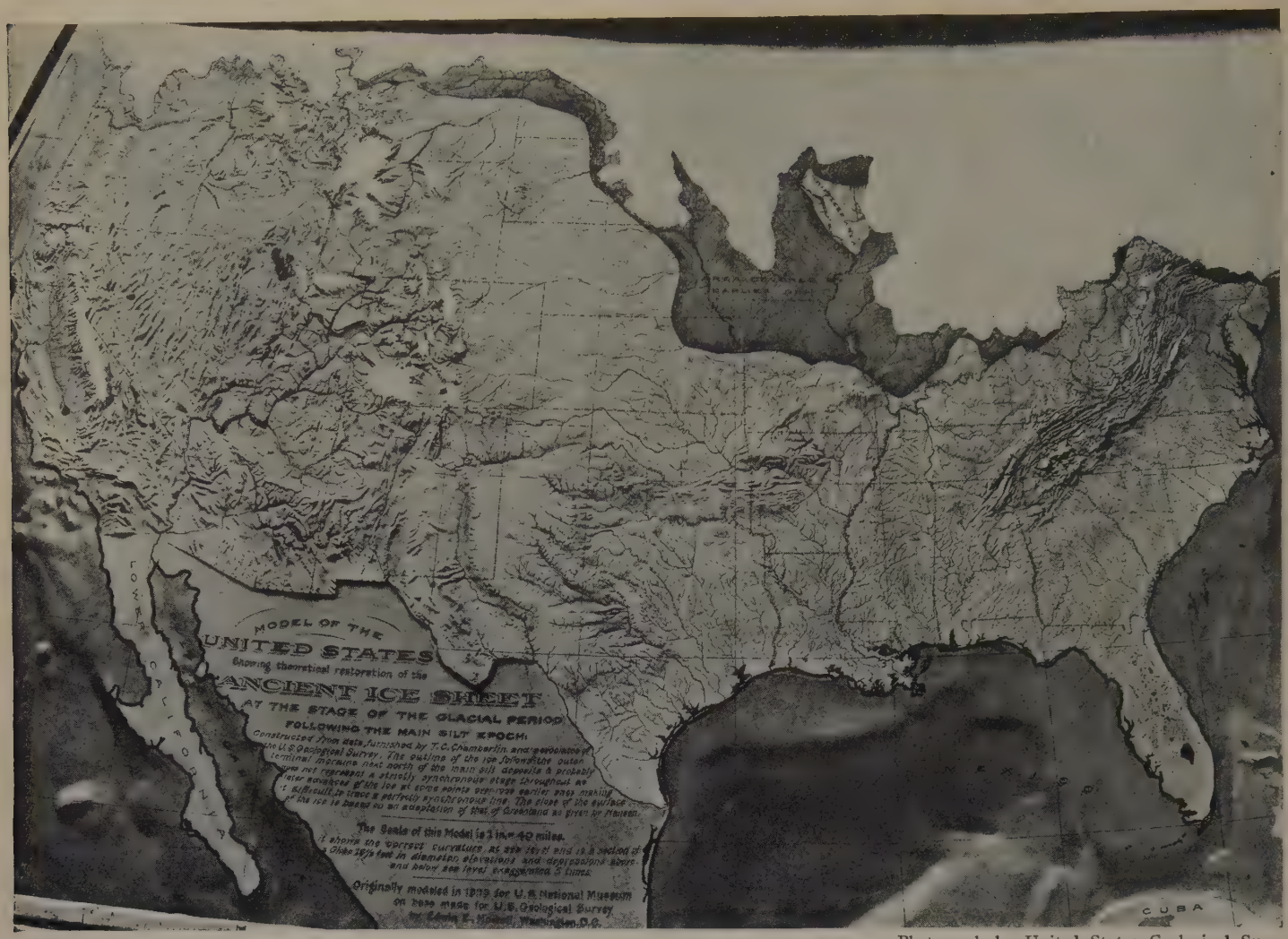

MODEL OF THE
UNITED STATES
Showing theoretical restoration of the
ANCIENT ICE SHEET
AT THE STAGE OF THE GLACIAL PERIOD
FOLLOWING THE MAIN SILT EPOCH.
The Scale of this Model is 1 in. = 40 miles.
Originally modeled in 1879 for U.S. National Museum
CUBA

Photograph by United States Geological Survey

GLACIERS OF THE LATER STAGES OF THE GREAT ICE AGE

The dark shaded belt was also covered by ice at earlier stages, but the white masses indicate the extent of glacial advance in the great Ice Age. This is known to geologists as the Ancient Ice Sheet.

tains themselves, they were to him the personification of majesty, the product of superhuman knowledge and power. There are those who know my inmost fiber, cell-duct, root, branch, and foliage, where I grew, and when I stood strong-rooted in old Mother Earth, and they will tell you that I tell the truth. This is my tale:

"Long ages past, in ancient Miocene time, I grew, a tree, with others of my kind in that wild land whence flows the Yellowstone. The seas had vanished from the land. The mighty dinosaur had then long ago breathed his last and left his massive bones entombed where now the prairie grasses grow, and in his place had come those mighty mammals—mighty in size, but with feeble brains—the Titanotheres, also tigers with great saber teeth, and other kindred creatures. Swamps stored up sunshine in black beds of coal for future use. Palms waved their fans in gentle breezes where now is boundless prairie, and with the palms stood many other trees that no longer grow in that region.

"I grew back in the hills and heard my grandsires tell how, in the dawn of Eocene time, there were mutterings of subterranean powers—of shuddering thrills that swept their massive frames—of pent-up forces struggling for release. The gods of fire and water and their powerful offspring had joined forces, and on their heaving backs the rock ribs of the hills slowly rose. They yielded, crumpled, bent, and broke. Fold on fold they rose above the prairies, block upon block they broke, slipped, and crowded over, like the fragments of a mighty ice pack in the Arctic. The Rocky Mountains, a vast cordillera, slowly rose as an impassable barrier across the former boundless plains. Then in an awful night infernal powers broke loose. I seem to feel and hear them now. Great rifts gashed the surface of the earth. High Heaven glowed red with reflection of the subterranean fires. Fierce gales of hottest gas swept down the slopes and burned the life from every living thing. Blast followed blast, hurling ashes, bombs, and white hot

TRICERATOPS, THE LAST OF THE DINOSAURS

This interesting illustration of prehistoric animal life is reproduced from a painting by C. R. Knight, made under the direction of J. B. Thatcher. The picture is one of the most striking of its kind.

molten lava to smother and to bury deep the vales behind the mountain wall. Vast clouds of dust and steam rolled high and overspread the sky as with a funeral pall. The thunders rolled, the lightnings flashed. Down came the rain in torrents, adding to the hideous terrors of the night, tearing the mountain sides, sweeping great rocks into the flood, and hurling the debris far o'er the land.

"They tell me this happened not merely once but many times. No sooner did the heavens clear and new grown forests cover up the awful wounds than Hell broke loose again. A dozen times or more did this occur, until the vale behind the mountains was filled to the brim, and there, in the Park, in Specimen Ridge, you can yet see forest upon forest, buried in volcanic ash and breccia. The stark and naked trunks stand as witnesses of the awful tragedies, mute, turned to stone, yet telling their tales as I am telling mine.

"High rose those great volcanoes, Sherman and Crandall, like great Etna or Vesuvius, 10,000 feet and more into the air, till finally their dread infernal fires were quenched, and stark and cold their peaks blanched white with snows of many winters. You think the bold Absarokas are high and rugged, yet they are but remnants of a mighty past. There

Photograph by Eugene Stebinger

THE ROCKY MOUNTAIN, TETON COUNTY, MONTANA

"Fold on fold they rose above the prairies, block upon block they broke, slipped and crowded over like the fragments of a mighty ice pack in the Arctic, forming an impassable barrier."

A GLACIAL PEBBLE FROM NORFOLK, NEBRASKA

Its face was scored beneath the moving glacier for it had traveled many miles to where it was found.

in Hurricane Mesa you see laid bare the heart of the old volcano, the filling of the monster's throat, a solid mass of rock, but the monster's head is gone.

"Here it was I grew, one of the last of those early noble trees. Bruised and broken by falling bombs, smothered by horrid gases, half buried by dust and ashes, the living sap passed from my veins,

FOSSIL PALM LEAF

This is like those found near Hysham, Montana. "Palms waved their fans in gentle breezes."

and in its place crept an acid juice that turned me into stone. Fiber, cell and bark, I was embalmed in silica, immortalized, never to decay, every crack and seam cemented with precious opal.

"Age followed age, again and again mountains and plains were lifted by the restless underground forces, and ever as they rose, the roaring streams cut deeper, slashing and gashing the mountain mass with valley, gulch and canyon. Frost-riven, the

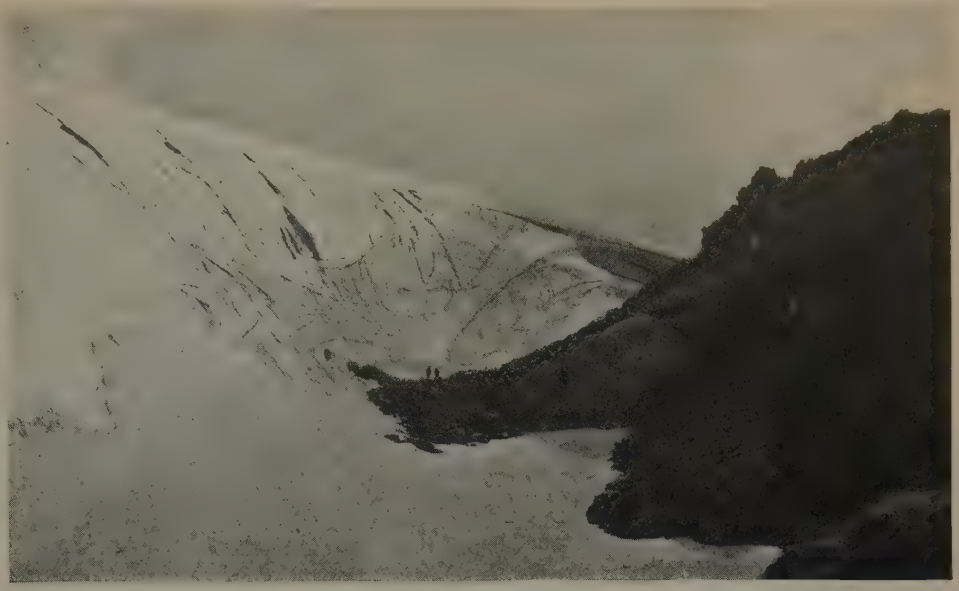
FOSSIL PINE

A magnified longitudinal section. These were once living tissues, "embalmed in silica, never to decay."

rocks crumbled, and the rushing waters gathered sand, gravel and boulders and rolled and ground and polished them in the giant canyon sluices. So was I seized with my petrified companions and broken, rolled, and ground up like the rest. Far o'er the plains the waters rushed hither and thither. They leveled hills and on the ground floor spread far and wide the burdens they had seized so wantonly. No sooner had they formed one smooth

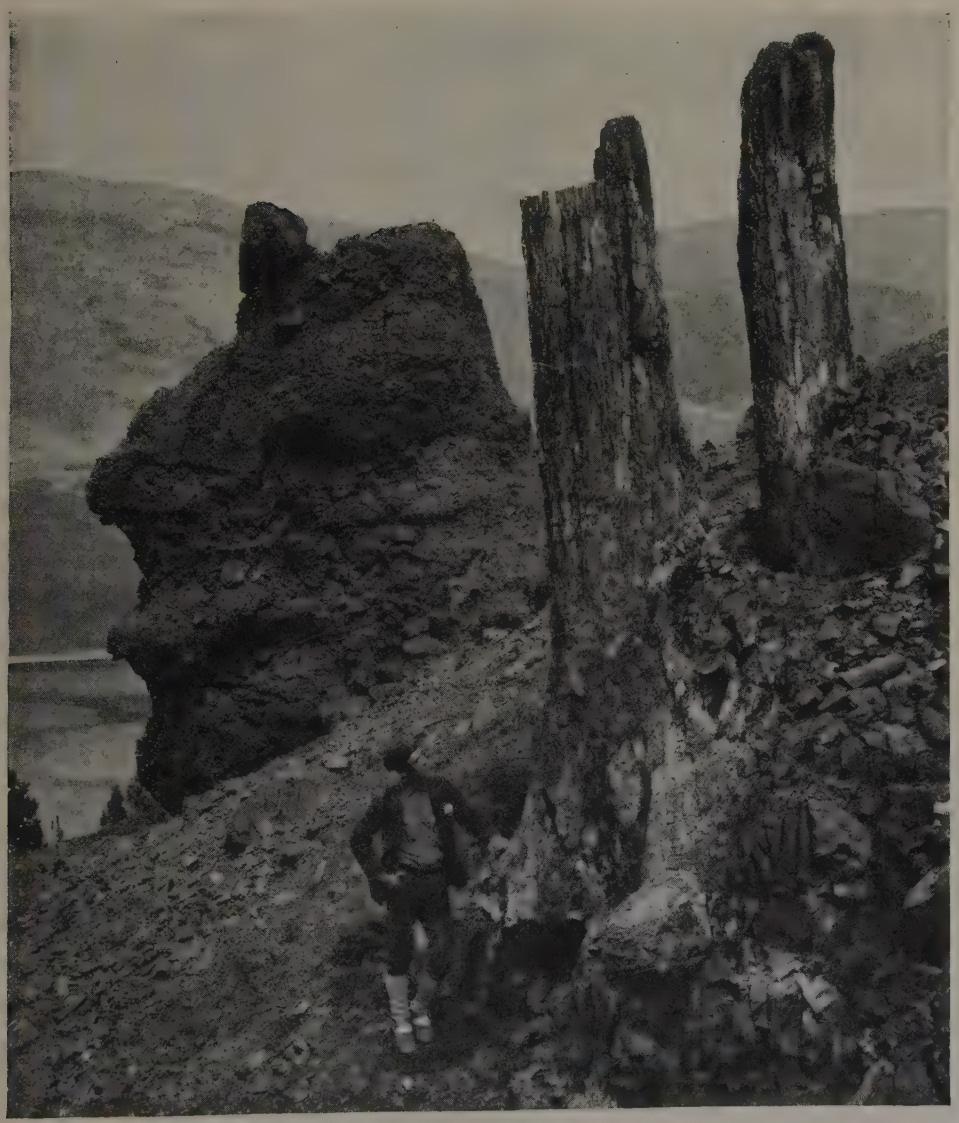
plain than new uplifts started streams to cut again and plane at lower levels, and here and there dissevered benchlands still remain perched on the hills or clinging as terraces to their sides. And so I came at last to lie where I was found, far from my native haunts.

"And ever as the rivers flowed fleet-footed horses came to drink, then dashed away to escape their stealthy foes. The ancestral forms were three-toed, but in such swift flight three toes for each foot were useless, and even two were more than enough, but with one toe upon each foot and



FRONT OF GRASSHOPPER GLACIER, NORTH OF COOKE, MONTANA

Here are remains of myriads of frozen grasshoppers, one of the most remarkable sights to be seen in any glacier in the world.



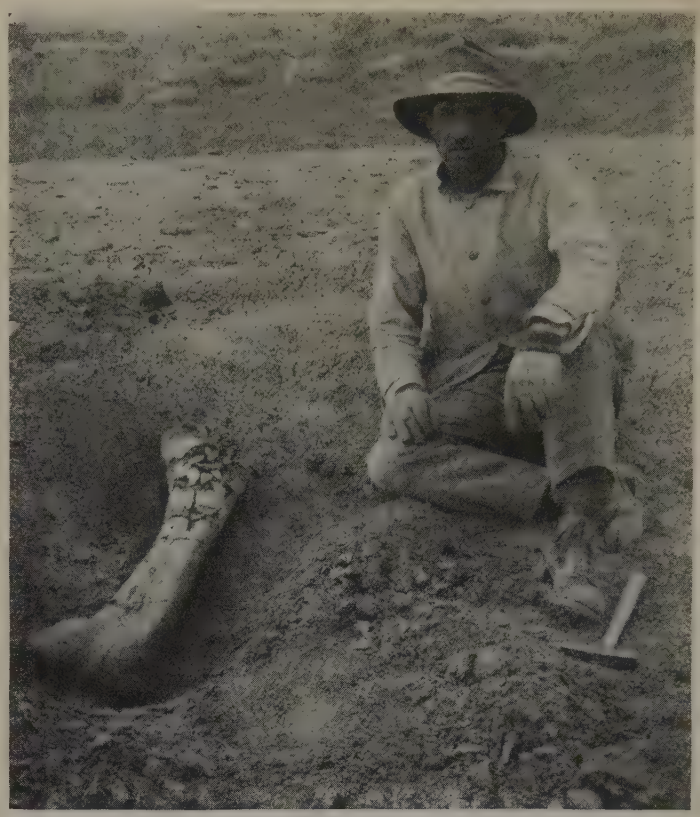
FOSSIL TREES IN YELLOWSTONE PARK

"The stark and naked trunks stand as witnesses of the awful tragedies, mute, turned to stone, yet telling their tales."

with the others withered away, they spurned the dust and fled onward like the wind. Those wild swift steeds are gone, and with them those majestic creatures, the great imperial elephants, the mastodons and the mammoths which came across on land from far Siberia and roamed so widely o'er the western continent.

"It's fortunate, perhaps, that I came when and where I did, carried onward by the Yellowstone to my last resting place. The balmy days soon passed away, and winter's snowy blast swept o'er the plains. Not simply winter as it comes each year with frosts and snows that melt fast in the warm spring's sun, but one long cold dreary age, lasting thousands of years—the Ice Age it is called. The snows piled higher and higher, the flakes were packed closer and closer, till the mountains were capped with ice, and vast sheets of ice spread o'er the land. Great glaciers thrust their frozen tongues from canyon mouths, and one vast plain of glittering

white stretched from the great Missouri to the Pole. Slow moving, inch by inch, foot by foot, mile by mile, it spread, terrible and irresistible. It turned the rivers from their northward courses to flow to far-off Gulf of Mexico. It blocked the Yellowstone and made a lake, but did not reach my resting place. At last the Frost King met a foe he could not overcome—the grim Goliath met his David, who seized the burnished shafts of genial sunshine and hurled them in the giant's face. Then those vast ice fields vanished as morning mists and left their toll of drift strewn over the land, a fertile soil for fields. Four times defeated, only to advance again; the fifth time was the last, unless, perhaps, the icy phalanx may some day advance once more. Here by my side lies a glacial pebble. Riven from his mother ledge near Hudson's Bay, he traveled with the Frost King far southward to Nebraska, and on his face are scars, mute witnesses of the terrible scorings he received beneath the moving glacier. He too could tell a tale.



DINOSAUR BONE

This was found north of Havre, Montana, a slight distance below the surface of the earth.

"All this has now passed into history. Still stand the 'Shining Mountains,' but where the prairie flowers grew are fields of golden grain, and in the tracks of the buffalo are bubbling springs of oil. The iron horse roars o'er the plain, and man has put his harness on the Great Falls of the Missouri. On the noble Yellowstone the rainbow-tinted mists still rise from roaring waterfalls, a lavish show of power; but see, stretched out toward the rushing waters are the covetous hands of men. Yellowstone Park is a land of wonders—boiling springs and spouting geysers, roaring cataracts between red-splashed abysmal canyon walls, wide-spreading lake, and near-by glaciers, the last remnants of the mountain ice caps. And of these wonders am I—though only a rounded bit of rock, I was once a part of that wondrous living thing, a tree!"

Fungus Diseases That Destroy Insects

(Continued from page 152)

electric fan was next arranged so that a current of air continually circulated over the fungus growths, and the spores were thus scattered in the air and among the damp colonies as soon as they appeared.

In a short time the aphids were affected in hundreds, and these were now placed, plants and all, among other pest-ridden nasturtiums, with the result that the whole aphis colony was reduced about sixty per cent. Fighting insect enemies by means of these fungi opens a great field to anyone with sufficient patience to study the different species and carry out careful laboratory experiments. We are likely, of course, to overestimate the importance of such tests, especially if they be attended with success in our laboratories, for we cannot say always, how they will turn out in the field. I have no doubt, however, that persistence and thorough investigation of the many little-known species, will ultimately result in benefits greater than those yet realized.

ANT INFESTED WITH FUNGUS

Note the two fruit stalks, like horns, issuing from the insect's thorax. (Much enlarged.)

The Marauding Moth Miller

By CHARLES WILSON

"FATHER, catch that miller!"

Father dropped his newspaper, startled by mother's sudden command. He waved his hand wildly over his head as the little buff-colored aviator zoomed past his baldspot.

"Heavens, mother," he said, settling back into his chair, "why scare a man to death? Let the poor little fellow alone; he's happy."

"Yes, he'll probably be happier in your dress suit than you are," mother observed. "But when the annual meeting of the chamber of commerce comes along you may have to hire your evening togs."

"Uh, uh," father answered, shifting to the sporting page.

"Yes," mother continued, "clothes moths aren't much bigger than that little half-inch one you looked so funny trying to hit, but they cost us a lot of money. You noticed he flew into the dark. That proves he's a miller and not one of those outdoor moths that live on vegetation. The moths that do the damage are easily scared. You should have seen them scurry away from that old baseball suit of Ned's that I found in the hall closet."

Ned let the current number of the radio magazine slide between his knees. "Aw, mother, is that all eaten up?" he wailed.

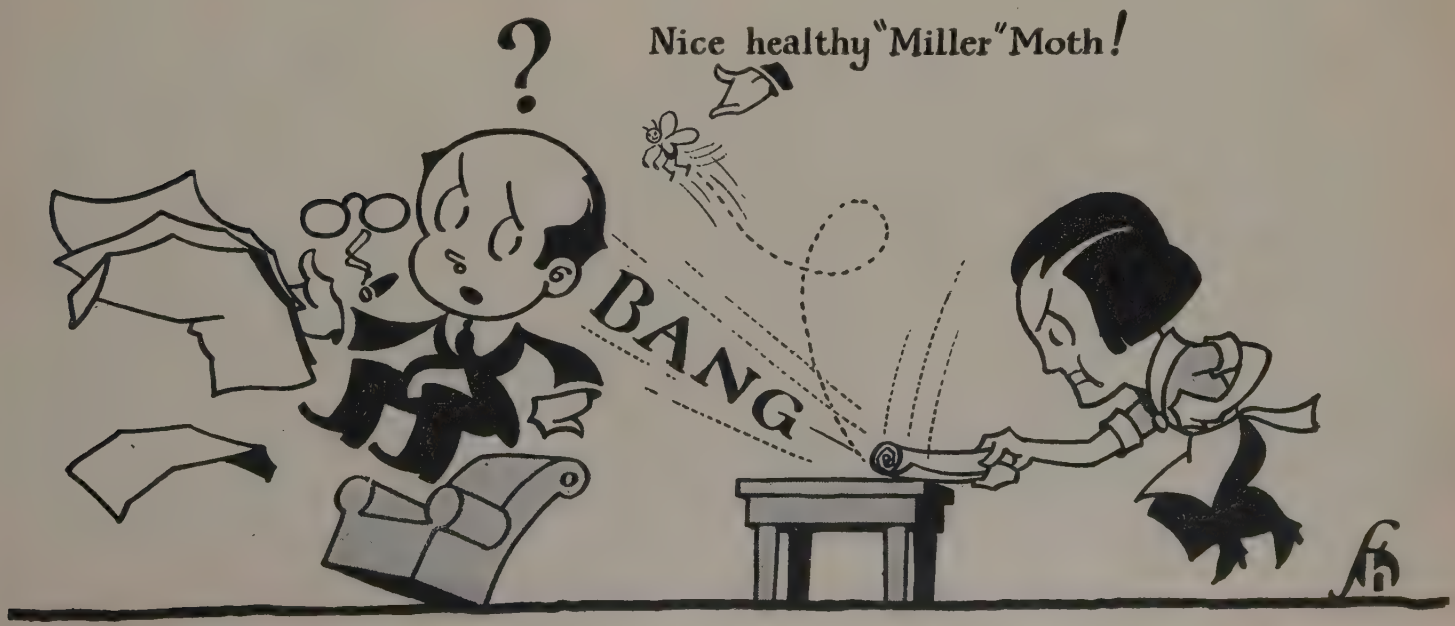
"Yes, badly. You should have given it to me to wash before you hung it way back in that dark closet.

"It's time you all knew something about moths," mother went on. Father laid down his paper. Betty closed her book on her finger. "I've always prided myself on being a good housekeeper, but somehow the moths have gotten in. I've been learning about their habits and I want your help in getting rid of them."

"That miller your father tried to kill doesn't do any eating," mother began, "but it lays the eggs that start all the trouble. There are two kinds of moths that eat clothes, I find. One is called a case-making moth and the other a webbing moth. It was probably the first kind that was flying about because it looked grayish yellow. If you catch one you will find its rear wings are silky and either white or grayish, and there are little dark spots on its forewings. The other kind is about the same size, but it is all pale buff color, with no spots.

"The moth doesn't live long because it doesn't eat, but before it dies it lays the eggs that do the damage finally. These eggs they deposit sometimes alone and sometimes in numbers. They may lay them right on the cloth or in the folds. In rugs, heavy woolen clothes and loosely woven stuff they bury the eggs. They like fur, hair, wool and feathers. Bristles agree with their digestion. They even make meals off the felts in the piano and the stuffing of furniture and stuffed animals. Which makes me think, father, we must look over that deer head in your den."

"Now, mother," father objected, "I know you



don't like that head, but I'm not going to let any little bug take it from me."

"The case-making moth," mother continued, ignoring her husband's plaint, "first lays eggs. These eggs hatch out into worms, taking about four to eight days in warm summer weather and a longer time in winter. The worm then makes a case for itself out of spun silk and pieces of your woolen dress or whatever he's been eating. He generally stays in his case, sticking his head and front part of his body out once in a while to crawl along to another meal. If he gets too fat for his overcoat, he'll make a slit half way down one side of it and piece in some new material. He'll do this on the other side and then, without ever getting out of his shell, will turn around and piece out the other end. When he gets fully grown up he ties his case to the material, closes it up and transfers to a chrysalis and then the moth again."

"Gosh," Ned observed. "What about the other kind — the webbing feller?"

"He's the worst offender, Ned," mother replied. "The worms are like the other one, but he doesn't make himself an overcoat. Instead he builds a tunnel out of silk, or leaves a lot of silky threads on the cloth as he runs around eating. The worms are white and about a half-inch long. When they are fully grown they spin a cocoon and then comes the chrysalis and the moth.

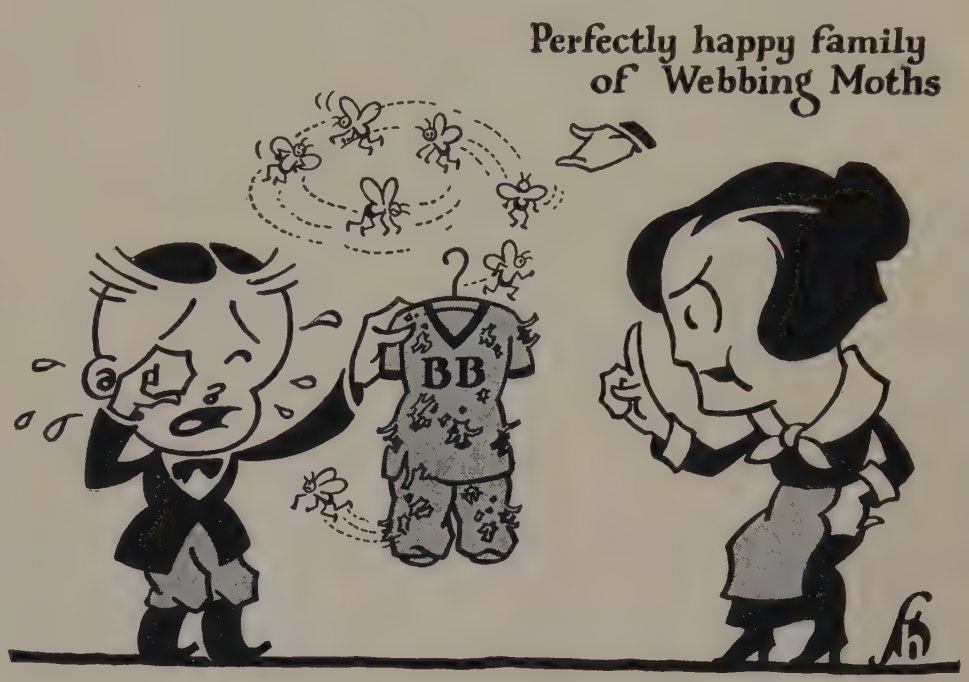
"There's another kind of moth that we don't find in the United States very often. It is larger than the other two, part of its forewings black and the rest pure white. Its rear wings are pale gray. It is called a tapestry moth because it likes coarse stuffs and has been known to destroy wall paper."

"What do you do to get rid of them, mother," Betty asked.

"The first thing to do is to give everything that the moth may be apt to try to make a meal from frequent brushing, sunning and cleaning. They won't get into the clothes you wear every week or so. Tomorrow, father, please bring your heavy coat home from the office so I can clean off all the soiled spots and brush out the pockets. I think that I'll pack it in paradichlorobenzene."

"In what?" father demanded.

"Don't make me say it again," mother pleaded. It's a flaky stuff like napthalene or moth balls, only better, they say. About a pound scattered in an average-size tight trunk will make a gas that kills off even well-grown worms. Gum camphor is not quite as good unless it is used in some very tight container. If I carefully wrapped the coat in unbroken paper or put it in a moth-proof bag I would probably keep out the moths, but I wouldn't be sure that there weren't some young worms inside. Although the eggs are delicate and can generally be crushed or gotten out by beating, one is not sure.



"Betty, I think that I'll send your fur coat to Graham's cold storage. It is really the safest way for such things. The clothes moths don't like a sudden change in temperature. Even if there are eggs they won't develop in cold storage. Also, I'm going to get you a tight cedar chest for your heavy clothes. This will protect them and if any young worms escape the cleaning, they will be killed in the chest."

"Does fumigation do any good?" father inquired.

"Oh, yes, but I don't think there are enough moths in my house for that," mother answered. "Formaldehyde fumigation is no use, but gas of hydrocyanic-acid is perhaps the best way. However, it is a dangerous gas to humans as well as moths, and I certainly shouldn't want to fool with it. Sulphur fumes is a good remedy but is liable to injure wall paper and fabrics and tarnish metal. I understand that carbon disulphid is good for single rooms or closets."

"Smells terrible," Ned interrupted, thinking of

(Continued on page 181)

Sugartime in the Maple Lot

By RICHARD W. WESTWOOD

RIVERS run in the roads. From the feet of the trees the snow recedes in widening circles. The winter sky is a deeper blue. Crows chatter. The sun rises higher in the heavens. As it warms the trees, the rich sap that Nature stored during the past summer in the roots of the sugar maples races up to feed the branches. It runs back again as the sun sinks. The sugaring season is on. The sweet sap is running.

Of all our truly American industries, that of making maple sugar is one of the most fascinating. Certainly none other has retained so great a measure of dependence upon the skill of the individual. It boasts many traditions. In a machine age it has found machines inadequate. It has never been and never will be a large-scale industry. In the quality of its product, and, largely, in the methods of its marketing, it is a personal proposition.

Scattered throughout the world there are about seventy species of maple trees. A baker's dozen of these grow in the United States. From all of the American group there comes a sweetish sap, but only the sugar and black maples yield a sap of commercial importance—and then in the colder climates. Although syrup and sugar can be made from their sap, neither the red nor the silver maples promise to add much to the annual output. The former is low in yield in proportion to the sap. The latter is uncertain in season, and its sap is likely to discolor.

When we think of Vermont we think of maple syrup and sugar. We immediately have an appetite for hot waffles or wheat cakes, sweetened with syrup. We want to sink our teeth in a luscious cake of maple sugar. Although for a long time Vermont led in supplying us with this product of her many maples, other states are actively in the field. New York, in fact, has gone ahead of the New England State in the annual marketing of the product. In the flow of its trees Vermont appears to hold its lead. Ohio, Pennsylvania, Michigan and New Hampshire produce sugar or syrup or both on a commercial scale, while the maples of more than a dozen other states produce on a small scale.

Before the first white settlers came to the New World the Indians had discovered the secret of the maple tree. Crudely and wastefully they were turning the sap into syrup and sugar. They cut

STEAM HERALDS WORK IN THE SUGAR HOUSE

Sliding and slewing through the snow, the horses bring the tank of sap to be made quickly into syrup or sugar.

slashes into the trees or large roots, collecting the sap through a reed or a piece of bent bark. Troughs cut from the trunks of trees or fashioned from bark were the gathering tanks of those days. To bring the sap which the braves had gathered to a boiling point, the Indian squaws heated stone after stone, dropping them in the troughs. Some

DROP BY DROP, THE BUCKETS FILL

Gathering the flow from a tree in the sugar bush. Metal buckets have replaced wooden on most of the farms.

of the Indians strained the sap through blankets and others found it simplest to let the large water content freeze repeatedly until it was virtually reduced to syrup.

When they set out for a trip into the wilderness, the Indians carried a ration of maple sugar mixed with powdered sweet corn. They also found it a succulent sauce for their roasts of venison. The Algonquin tribe came to be known as "tree eaters" because maple sugar played such an important part in their tribal menu.

For a time the white men followed the primitive methods. Stories were carried back to the mother lands of the sweet syrup and sugar taken from trees. Gradually circular holes replaced the killing slash in tapping the trees. Spouts of various kinds were used to drain the sap, and wooden buckets to catch it. The early processes of boiling and evaporation were crude affairs, done in the open, and a few pieces of twig, bark or leaves in the product were considered only unavoidable imperfections.

For many generations maple sugar was regarded as a necessity in the northeastern states. White sugar was a luxury, brought from Boston in large white cones and served in the tea when the minister came to call. Rapidly, however, cane sugar became the necessity and the low-priced sweetening commodity, and as rapidly, during the last sixty years, maple sugar has gone into the luxury class. Now let us see what Nature does—and then man—to give us this sweet luxury.

It is a warm summer day. The broad-crowned maple stretches its green leaves to the sun. Na-

BOILING THE SAP OUTDOORS

All hands and the cook turn to for the work. Sugar houses have largely taken the place of evaporators used in the open.

ture is at work performing one of her magic tricks —making liquid sunshine. Through an alchemy that even scientists have not solved, the green leaves are storing up starch and sugar. The roots of the maple are drawing richness from the soil moistened by springs and warmed by the sun. Water, sugar, with dashes of lime, potash, iron, magnesia, and acids of vegetables are being made into maple sap. The tree is breathing, inhaling and exhaling, taking from Nature's great storehouse things to make this peculiar rich gift of the maple tree.

If the maple tree is rich in leaves, spreading

out into the air, and the summer has many sunshiny days, the sugar content of the tree will be the greater. The sap will contain between 2 and 6 per cent of sugar, Nature's food for the tree.

Fall comes and the leaves drop. The work of storing strength has been done. Then the winter, with freezing and snow, until the spring makes its first signs. One morning the owner of a maple lot will step to the door of his house. It is crisp and clear, after a night when the thermometer has hovered around 25 degrees. The air is tonic, and the rising sun gives promise of sending the mercury to 55 during the day. The wind is damp and from the north. It is probably about the middle of March, although it may be earlier or later by a few days.

WHERE THE YOUNGSTERS FIT

One of the fondest memories of the country boy grown to a successful business man in a city office is a sweet revel at sugartime.

So it begins. Shiny augers bore clean half-inch holes in the trees. Metal spouts are in place, with covered buckets hanging from them. Drip, drip—the sap flows as it pumps up and down within the tree. The horses flounder through the snow. The gatherers hurry from tree to tree, emptying the buckets into the tank on the sled. The sap must not stand, but must be made quickly into syrup. Fifty gallons of sap to one of syrup. The sled slews to the tune of the slopping of sap in the tank. Then away to the sugar house. Gurgling through a pipe, the sap is emptied into the storage tank.

It is night now. Probably little or no sap is dropping into the buckets. The family is gathered in the sugar house. Steam and sparks puff and jump as the hot fires boil the sap. Fast boiling means the purer, light-colored syrup. The sap is in the evaporator now, foaming and fragrant, flowing from compartment to compartment. It grows thicker and sweeter, until the deft sugar maker draws it from the syruping-off pan.

Now, day or night, the farmer is making sugar. All of the utensils—evaporator, pans, spoons—must be clean, for cleanliness means quality. He stirs rapidly, intent on keeping the light color and making fine grained sugar. He lifts a bubbling dipper of fragrant syrup. A moment now. The syrup "sugars off." It is run quickly into pans to be

(Continued on page 180)

Trees and How to Plant Them

By CHARLES LATHROP PACK

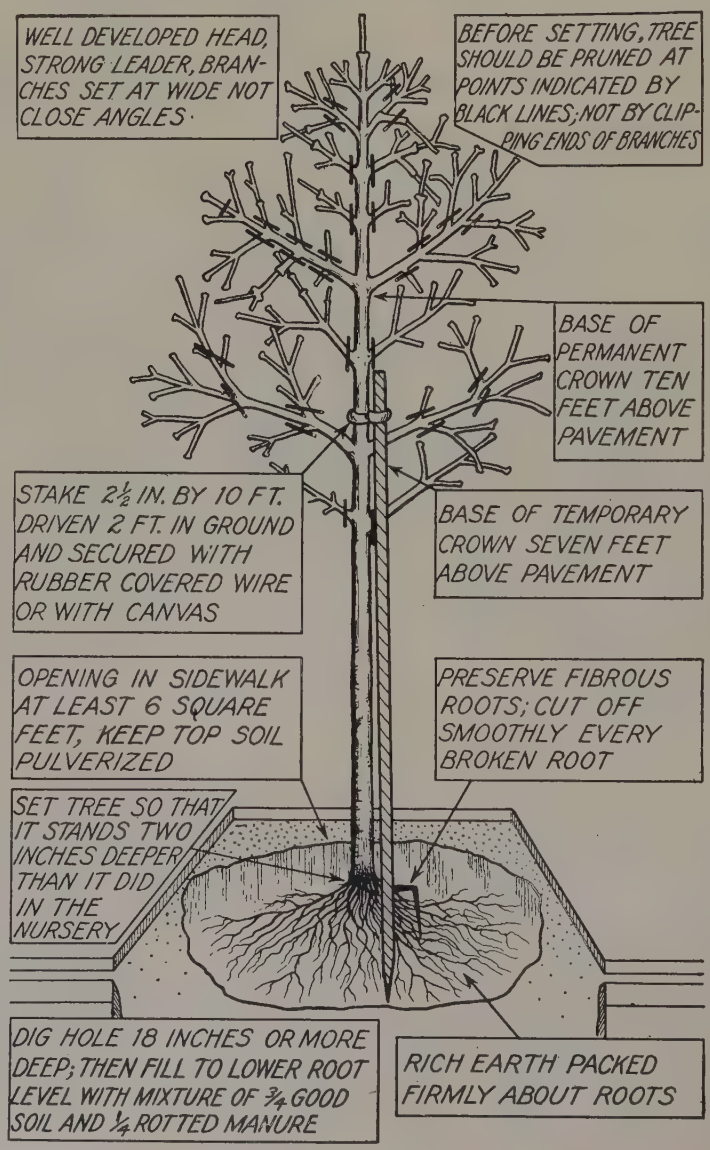
President American Tree Association

THIS is tree-time. In the east buds will soon be bursting and the frost leaving the softening ground. In California and the south spring is here. It is the season of Arbor Days, when the nation pays renewed tribute to the beauty, value and symbolism of trees. In some states of the south, clubs, school classes, eminent citizens and many others have already packed the earth about the roots of new young trees. This month and next many more will perform this pleasing and worthwhile task.

With the waning of our forest resources, trees have come to hold a higher position of respect in the public mind. They are recognized as one of the most fitting forms of memorial. Roads of remembrance, tree-lined memorial highways, living and growing trees as tributes to individual achievement or sacrifice are being dedicated in many places. Arbor Day is an institution in all of our states, proclaimed by their governors. It is observed by the young, who plant trees that they may grow up with them; and by the old, who wish to leave something living behind them.

Tree-planting this year promises to outstrip even that of former years. College classes are planting trees on many campuses as a record of their years of study. School children are carrying on the work of beautifying the grounds of their school buildings. Veteran organizations are dedicating more trees to their comrades. Citizens groups are busy laying out trees to shadow the thoroughfares of their towns and cities. State and city are lining new highways with trees. Home-owners are planting for the future beauty of their homes. It is tree-time.

There are certain practical questions, however, that must precede any such program. First, there is the consideration of the kind of soil in which the tree must grow, the climate and the kind of tree that will thrive. Thought must be given to the location of the tree, the space it will have in which to develop, and the variety that grows best in the vicinity. It is well, also, to consider whether it is not better to plant trees of long life, such as the oak or sycamore, instead of trees like the silver maple or the poplar that mature after a shorter span of life. Whatever the choice of the tree, it is deserving of careful thought.


WELL DEVELOPED HEAD, STRONG LEADER, BRANCHES SET AT WIDE NOT CLOSE ANGLES
BEFORE SETTING, TREE SHOULD BE PRUNED AT POINTS INDICATED BY BLACK LINES; NOT BY CLIPPING ENDS OF BRANCHES
BASE OF PERMANENT CROWN TEN FEET ABOVE PAVEMENT
STAKE 2½ IN. BY 10 FT. DRIVEN 2 FT. IN GROUND AND SECURED WITH RUBBER COVERED WIRE OR WITH CANVAS
BASE OF TEMPORARY CROWN SEVEN FEET ABOVE PAVEMENT
OPENING IN SIDEWALK AT LEAST 6 SQUARE FEET, KEEP TOP SOIL PULVERIZED
PRESERVE FIBROUS ROOTS; CUT OFF SMOOTHLY EVERY BROKEN ROOT
SET TREE SO THAT IT STANDS TWO INCHES DEEPER THAN IT DID IN THE NURSERY
DIG HOLE 18 INCHES OR MORE DEEP; THEN FILL TO LOWER ROOT LEVEL WITH MIXTURE OF ¾ GOOD SOIL AND ¼ ROTTED MANURE
RICH EARTH PACKED FIRMLY ABOUT ROOTS

It may be that in nearby wooded sections there are many young trees, saplings or evergreens. This, of course, makes an easy source of supply with the advantage of obtaining trees that live well in the vicinity. Experience shows, on the other hand, that it is often more satisfactory to buy nursery trees especially raised for transplanting. As a piece of general advice it might be said that evergreens of 5 feet in height and deciduous trees up to 12 feet, raised in a nursery, will give the best results.

Once the really entertaining problem of selecting the proper trees has been solved, there come the details of preparing for planting. Care must be taken of the tree. The roots must not be bruised or allowed to dry, and moist earth should be kept around them until

just before they are put in the ground. This is extremely important, because a few moments of ill-advised exposure of the roots to the sun, wind or dry air will injure the future of the tree.

Unless the delivery man has more than the average affection for a tree, it is liable to arrive with some broken or bruised roots. These should be pruned, and at the same time the top of the tree can be shaped up. The pruning should be done cleanly with a sharp pruner.

There are supporters of both spring and fall as the time for planting deciduous trees. Both have good arguments. If one were to lay down a general rule, however, it would be safe to say that all trees except evergreens can be planted at any time during the period between their going to sleep in the fall and awakening in the spring, and when the ground is not frozen. In the northern states, the early spring is the best time for the inexperienced planter. Evergreens can be put into the ground in the late spring and during the latter part of August and the first of September.

A cool and cloudy day is the best for planting. In preparing the hole for the tree it should be made large enough to hold the roots extended normally. It should be deep enough for a 6-inch layer of good loam before the roots are put in. The soil should be carefully worked around the roots with a pointed stick. No air spaces should be left, and it is as well to soak the soil around the roots so that the tree will stand firmly. Most trees should be planted 2 or 3 inches lower than it was in the nursery or the woodlot.

There can be no fixed rules for spacing trees. Along streets they will range from 30 to 80 feet apart, depending upon the variety used. Except along highways, it is best to plant the trees fairly near together, and the ones that crowd can be cut out later.

If the tree planter has not pruned his tree before he put it in the ground, it should be done immediately afterward. Frequently there is too little rather than too much pruning at the top. The tree top should balance the root systems. Many tree planters find it best to remove all the side branches of the deciduous tree, leaving only the leader or main shoot. This leader should not be pruned back in the deciduous variety. There is no need of pruning the top of evergreens at the planting time, and except in the case of some varieties of cedar, it is undesirable.

The work is not over when the tree is in the ground and the soil packed about it. Where there is liable to be strong wind the tree should have the support of a strong stake reaching up into the lower branches. Guards should be around some trees, particularly along the street. For the first two years the base soil will need cultivation. As the trees grow they will need pruning—a question

(Continued on page 179)

SELECTED LIST OF TREES BY STATES

For New England States, New York, Pennsylvania, New Jersey, Ohio, West Virginia, Kentucky, Indiana, Michigan, Illinois, Missouri, and Iowa:

DECIDUOUS TREES

Sugar maple	White ash	Pin oak
Norway maple	American white elm	American linden
Scarlet maple	Red oak	Scarlet oak
Green ash	White oak	

EVERGREEN TREES

White spruce	White pine	Hemlock
Colorado blue spruce	Scotch pine	Arbor vitae
	Balsam pine	

For Delaware, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, Georgia, Tennessee, Florida, Alabama, Mississippi, Louisiana, Arkansas, Oklahoma, and Texas:

Tulip	Norway maple	Willow oak
Sycamore	Scarlet maple	White pine
Pin oak	Red elm	Longleaf pine
Scarlet oak	American white elm	Magnolia
White oak	Kentucky coffee tree	Live oak
Black oak	American linden	Cedar of Lebanon
Red oak	Red gum	American holly
White ash	Black gum	
Bald cypress	Hackberry	

For Wisconsin, Minnesota, North Dakota, South Dakota, Nebraska, Kansas, Colorado, Wyoming, Montana, and Idaho:

Bur oak	Hackberry	White pine
Linden	Honey locust	Norway spruce
Norway maple	Black locust	Colorado blue spruce
Green ash	Less desirable:	
Wild cherry	Cottonwood	White spruce
Larch	Box elder	Red cedar
American elm	Scotch pine	Arbor vitae
Black walnut	Austrian pine	

For New Mexico, Arizona, Utah, and Nevada:

Hackberry	Bur oak	Box elder
Honey locust	Valley cottonwood	Arbor vitae
Green ash	Mountain cottonwood	Deodar cedar
American elm	Mountain ash	Box
Black locust		Euonymus

For California, Oregon, and Washington:

DECIDUOUS TREES

Coast Region

Large-leaved maple	European linden	Sycamore
Weeping willow		

Columbian Basin

Norway maple	Sycamore	Russian poplar
European linden	Green ash	White willow
	Silver poplar	

EVERGREEN TREES

Deodar cedar	Monterey cypress	Lawson cypress
Monterey pine		Bigtree

Pittsburgh Blazes a Trail

TRACTORS and tinware, flivvers and flour, ships and soap, cement and candy, hats and hams, railroads and rugs. From myriad signboards the respective merits of these wares are proclaimed to us. We go into the stores and buy them, lured by a catchy slogan or a striking picture.

In Pittsburgh, however, there is something new in signboards. Societies founded to study, protect and make friends with our birds and animals and to preserve and upbuild our waning forests, have embarked on a nature conservation program. They realize that it pays to advertise. They know that the public appetite is sharpened, the public taste directed, the public opinion formed by informing the people.

On the main artery of traffic, the boulevard running from the down-town district to East Liberty, one sign has been erected. On it a wistful little bear cub says, "They just shot my mother!" Then he asks, "Is this your idea of sport?" The passerby—and there are two and one-half million of them in a year—first smile at the appealing little chap. Then what he says begins to sink in. They answer his doleful question to themselves. No referendum is necessary to discover what the majority of answers are.

The furriers don't like the sign a bit. In fact,

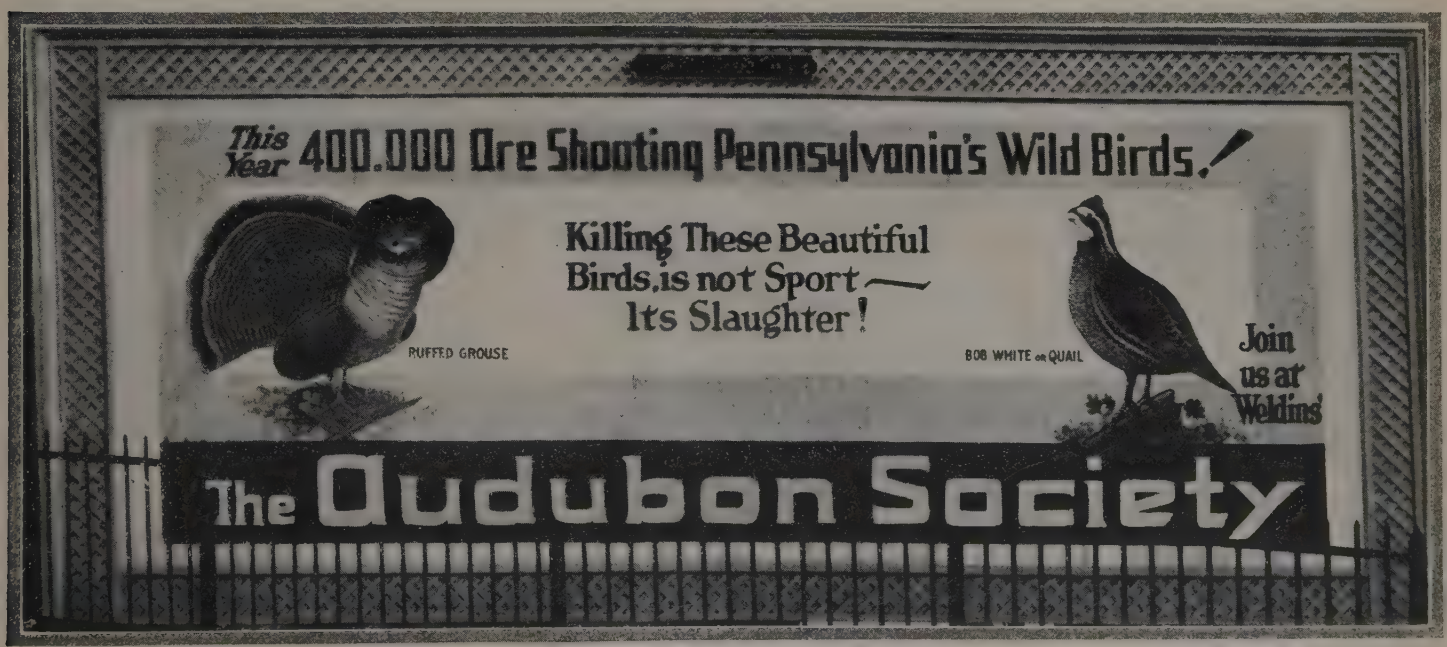
they refer to it in no uncertain terms. They have visions of an aroused public opinion telling their legislators at Harrisburg to get busy on legislation with respect to trapping and gaming.

With striking pictures of ruffed grouse and quail and black-billed cuckoo, the Audubon Society is advertising our bird friends. It is telling the people how many among them arm themselves every year with guns instead of cameras to shoot these beautiful birds. It is telling the people what certain birds do to protect the crops, the trees and the public against various insect pests.

Against the wasteful scourge of forest fires, the people are being aroused by advertising. A signboard showing hungry flames leaping through a forest growth is likely to make the motorist thoughtful of the cigaret or match thrown by the roadside. Such a sign will stow away in the back of the departing camper's mind a thought about well burying his campfire.

The conservation societies in Pittsburgh are blazing a trail. It is a trail that could be and should be followed by similar organizations throughout our country. Advertising has been designed and developed to make the people think about spending their money for this automobile or that brand of soap. Wisely and well it is now being directed to making people think about making an investment in friendship and protection of invaluable wild life.

May others follow the trail that the Pittsburgh societies are making into the forest of public opinion!


This Year 400.000 Are Shooting Pennsylvania's Wild Birds.!
Killing These Beautiful Birds is not Sport — Its Slaughter!
RUFFED GROUSE
BOB WHITE or QUAIL
Join us at Weldins
The Audubon Society

Our Common Red Newt

(Triturus viridescens Raf.)

By AGNES KUHN

WHILE listening to a lecture on our native reptiles and amphibians delivered by an authority on the subject I was surprised to learn that little or nothing was known concerning the life histories of these semi-aquatic creatures. So I resolved to collect some of these creatures to use as subjects. A collecting trip to the streams and ponds of the Palisades of Interstate Park yielded six of our common red newt or salamander (Triturus viridescens Raf.) which I caught in very damp places near a sluggish stream. I caught

RED NEWT (Triturus viridescens)

To afford congenial surroundings the terrarium should be stocked with growing plants.

many more but kept only the six which were the largest of them. This was late in October.

I got a rectangular, glass-sided aquarium which had been used as a home for goldfish and prepared it for the use of my new acquisitions. Ordinary gravel as used for fish, washed clean and spotless, filled one-half of the tank to a depth of about 4 inches, and the other half was filled with water to make it, as I thought, very nearly as these creatures were accustomed to have it. A small twig placed crosswise in one corner on the gravel was all the decoration or foliage I thought would be necessary. But I soon learned otherwise, for my guests were not at all delighted with their new home and remained always in hiding under the twig. Some mornings I would find them in the water with their heads out, but as soon as they became aware of my presence they secluded themselves in their usual hiding place. It next occurred to me that some plant life would be just the thing to make them feel at home and come out from hiding. As nothing could be expected to grow in the clean gravel it was necessary to put earth under it. After putting this in the tank, however, the water section would always be dirty and the whole thing looked very unsightly. I now divided the land section from the water section with a piece of glass so that the water could not touch the earth or gravel. I also put a small floating bridge in the aquarium section and attached it to the division plate so that the salamanders could crawl in and out with ease. This, too, was a failure, for while they would use this to go into the water they ignored it completely when trying to get out and struggled pitifully to get up the sides of the aquarium. Furthermore, the small wood ferns and other plants I had put in the ground died, and upon examining them I found that the roots were all rotted. All this time I fed the salamanders on small white worms (enchytrae), but as they ate only those worms which came within easy reach

LARVAL SALAMANDER

This, though a different species, shows the gills of the larval newt, as they appear before they are absorbed at the approach of maturity.

of their hiding place under the twig most of the worms would crawl into the gravel and die. My bright red salamanders had gradually turned a dull brownish color.

I had learned now why so little was known regarding the habits of such fussy creatures and was all the more determined to prepare a home for them in which their native habitat would be so nearly reproduced as to make them forget that they were in captivity. I had learned that a terrarium must have a water section and a land section but that

they must be entirely independent of each other and that each must sustain the elements necessary for the well-being of the inmates. The water in the water compartment must be clean and fresh, and the land section must produce sufficient foliage for hiding places, but only under leaves, etc., so that the inmates may be observed at any time. The side of the water compartment approaching the land must be made so that the inmates may crawl out with ease. With this end in view and by making further experiments I produced a receptacle which has proven to be as near to the natural conditions as anything that can be made in our homes.

During the early part of March I had one of these terrariums all set with growing plants, affording shade as well as open spaces, the water section, about 4½ inches deep, containing a layer of gravel in which small aquatic plants were growing. The gradual slope of the water compartment was exactly like the natural bed of a stream. Into this terrarium I placed my six salamanders. I had stocked the water with small water fleas (daphnia) which I had collected at a nearby pond, and it was with inexpressible delight that I saw all six plunge immediately into the water and begin to eat this food which to them must have been like lobster or some other rare viand. They did not come out on land until this stock was all consumed and then only very slowly as if loth to leave it. They lingered in the shallow parts of the water section, half of their round little bodies in the water and half above, looking like tiny, naked babies basking in the sun. On land they crawled into the lower branches of the ferns, lending bright spots of orange to the solid green of the leaves. I was now convincd that conditions were ideal and decided to keep close watch on my subjects.

RED NEWT (Triturus viridescens)
In this picture the fine spotting of the underparts is shown.

They spent more and more time in the water now, and over their tails grew a sort of skin filament which was more pronounced in the males. The males and females could now be distinguished, the ground color of the males becoming very dark brown with brilliant red spots all over the body. These red spots are always present but do not always stand out in contrast as at this time. In the females the development of the spawn rounded out their bodies, which were of a lighter brown than the males, fading into yellowish underneath. Observing that two of them kept almost always by themselves, an action which appeared to signify more than mere friendship, I removed all the rest of them and watched the pair with eager expectations. The morning sun shone brightly into the terrarium from above and sides, and I could observe their actions without in any way making my presence known to them, a precaution which I learned was unnecessary, for they were not in the least disturbed by being watched. They were living in a world by themselves and cared little what was going on outside of it.

As in higher forms of life, the female is pursued by the male. Ordinarily, salamanders are somewhat sluggish, making no sudden or darting moves, but when in the springtime they comply with Nature's law to reproduce their kind they become very lively. The male drives the female continually, darting in front of her at times to show off his beautiful color which appears more vivid due to the excitement of the chase, and switching his tail vigorously much as a tomcat does in his backyard skirmishes. These actions continue for several days, the female avoiding the male but her actions never daunting her ardent lover. Finally the mating is accomplished and the female deposits a number of tiny eggs, about 1/32 of an inch in diameter, which within twenty-four hours, having all remained together in a

JAPANESE NEWT (Triturus pyrrhogaster)
In this showy species the underparts show large black blotches.

hollow in the sand, became enclosed in a large transparent, gelatinous mass. At this stage the salamanders no longer recognized their spawn, and they consumed a goodly portion of it before I removed them from the terrarium. Eight days later I saw the first sign of life in the eggs, and during the ninth day the young newts made their appearance—eleven of them. To my surprise they looked nothing like their parents, appearing more like tiny tadpoles than anything else. They seemed to be all head, the large ruffle of gills making up the most of it. The remainder of the body was just a black tail. These squirmed and wriggled about the first day, being almost helpless, but on the third day of their existence they swam around as freely as tadpoles, but three of them had disappeared. For the first few days they fed on tiny microscopic life (infusoria), after which they ate anything their parents ate—daphnia, white worms, dried shrimp and dried daphnia. They also relished a bit of raw beef wriggled on a toothpick to make it seem alive.

After four months they were almost as long as their parents but more slender, and the front legs made their appearance. They now crawled out in the shallow water and occasionally stuck their heads out, but on the first sign of danger they all swam into deep water. Some of them lost their gills in August, while some remained in the larval state until the end of September, when they all took to the land the same as their parents; in fact, were exact replicas of their parents.

While in the larval state and after their first excursions on land they often shed their skin, which they ate without ceremony. This is a very interesting process to watch as they roll it off of their bodies, having quite a time getting it over their hind legs. When I first saw one of the parent salamanders do this I attempted to help him, but this is unnecessary, as they crawl over and between stones which helps to hold the skin while they wriggle out a little, and as there is no particular hurry about getting it off they rest a while and sometimes another salamander will give a hand by taking hold of the skin with his mouth and pulling on it.

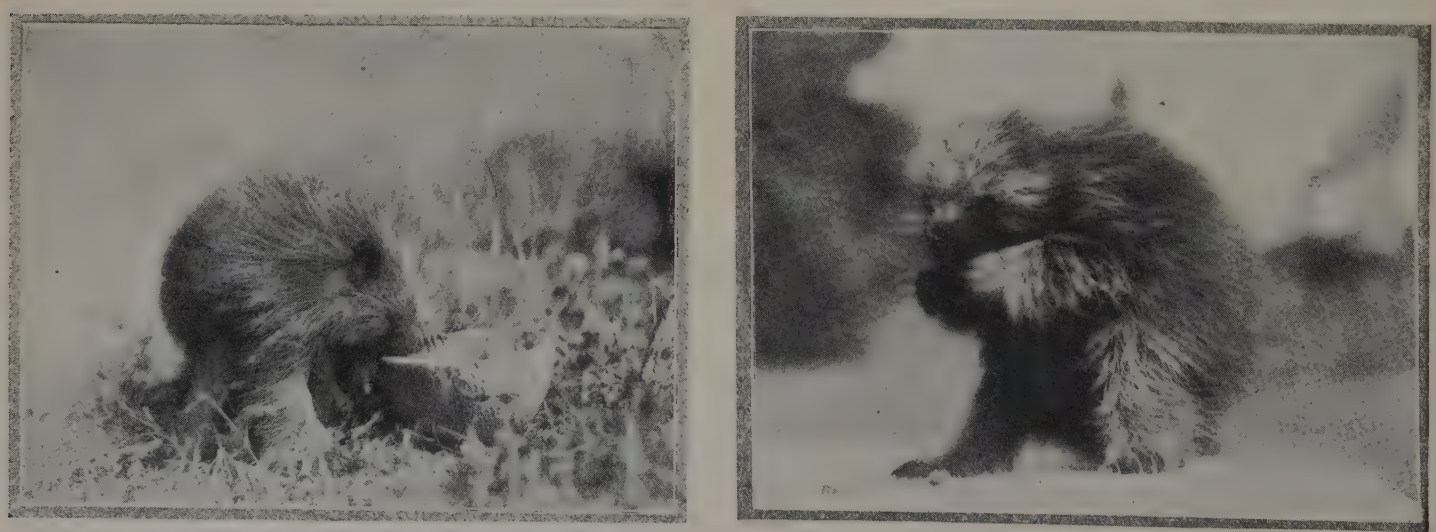
Thus I raised my family of salamanders and expect to try with other species, many of which are also very interesting.

A species related to the one here described and one which is frequently kept in terrariums, the Triturus pyrrogaster of China and Japan, is shown herewith. It will be seen that it differs from our red newt in having large dark blotches beneath.

Dinty, a Pet Porcupine

(Continued from page 137)

to wander a little more and stay out nights occasionally. The call of the woods was in him. He eventually worked on north through the forest along the river. If you ever meet him, he may seem reticent or bashful. Sit quietly by for a little while. If you are friendly and unafraid, he will surely show the love for human kindness that he gained in his year's stay as one of the members of our family.



DINTY AT DINNER TIME

At meal time Dinty propped himself up on his short stubby tail and handled his food in an expert manner with his hands. He liked to eat himself to sleep, especially when he had a meal of a dozen big Royal Ann Cherries. His long claws open and close just as the fingers of a human hand. He was about 5 months old.

Nature Lore as a Handicraft

By WILLIAM GOULD VINAL
Rhode Island College of Education

NATURE-LORING has been complimented. It has been invited to sit in with garment making, millinery, basketry, toy making, radio, electric toys, photography, lettering, posters, wax works, pyroxylin, printing, weaving, textiles and tin-can toys. Sounds rather grand to those of us who have seen nature-study pass through the age of the sentimentalists—the fluffy-duffy stage of fifteen years ago.

This is how it happened:

During the school year 1922-23, the Junior Achievement Bureau of the Eastern States League of Springfield, Mass., sent its assistant director, Mr. Frank O. Kreager, to Providence, at the request of Dr. Richard Allen, the director of research and guidance in the public schools, for the purpose of organizing junior achievement clubs and of training leaders. "Teachers, parents and older young people were organized into leaders' clubs, were trained in handicraft work and club management, and were assisted in the formation and conduct of junior achievement clubs. Thirty-one clubs completed the season and ten participated in the Eastern Arts Association Exposition in May at the State Armory."

It is as a result of this demonstration of the practical value of achievement clubs that the Providence Handicraft School for club leaders has been undertaken by the Lions Club of Providence and the Providence public schools.

The expense of this cooperation project is being borne by the Lions Club as a part of its program for community service.

The general purpose of these achievement clubs —to again quote from the Handicraft School announcement—is as follows:

"Most city children do not have many of the advantages which were enjoyed by children a generation or two ago. The homeshop and home industries have disappeared. Opportunities to engage in constructive work with tools are very limited in the home as well as in the public schools. Such work is generally recognized as necessary for the normal development of the interests and talents of children and as a valuable resource for the profitable enjoyment of leisure time."

Now it came to pass that all the courses except nature study could be given in the Providence Trade School. Mr. E. A. Anderson, the director of this unique school says: "If you can't bring the job to the school take the school to the job." That is just what happened in the nature course and the printing class cooperated by getting out an outdoor almanac. Instead of calling it a class period for nature study it was named the scouting almanac for the Woodcrafters of Quinsnicket. Other communities may wish to organize a similar course and may secure the scouting almanac by writing for it.

The "leaders' class" is carried on in the same way that a leader is expected to carry on his tride. If there are fifteen children in the tribe they are divided into three clans of five each. Each clan consists of a chief, assistant chief, scribe, and two clansmen. The chief or the assistant in his absence directs the tribe, and the scribe takes care of the records. Competitions by clans and points of achievements for individuals are effective stimuli. For the group—each one on time earns a point for his clan. The same is true if he comes properly dressed for a hike. The clans receive three, two or one point, according to their rank in the building, care and extinguishing camp fires; success in cooking; neatness in cleaning up; and winning of games. Individual achievements are given for telling a story to the tribe successfully; singing a song in good favor; contributing something worthwhile to the exhibit; helping out the forest in a commendable fashion; showing ability to use a map; or following a wooded trail by compass, and the like. At the end of each trip the individual knows his own efficiency and that of his clan. This system is quite similar to the patrol method just published by the Boy Scouts of America.

There are three fundamental stages in hiking—

(1) what to do while hiking; (2) the building and care of the fire; and (3) the overnight hike. Every individual is given a list of questions that he should be able to answer for each degree. He is not considered a responsible hiker until he can answer these questions about the hike; he is not allowed to build fires until he has passed the fire builder's degree; and to be an over-night hiker he must pass not only these two but a third degree. The clans are given the questions and twenty minutes for a clan discussion. This takes place in any nook which they choose. The leader visits each nook and allows the chieftain to ask five questions. The chief selects the five questions that he believes they will have the most trouble in answering. At the end of the twenty minutes the signal is given and the clans stand by the council fire. The leader asks one question of the first in line of clan number one. If the question is answered correctly the leader asks a second question of the first in line of clan number two. If anyone fails he sits down. This contest continues, after the plan of an old-fashioned spelling bee, for ten or fifteen minutes. The clan having the greatest number standing at the end of that time has three points, the next two, and the last one. A clan whose members can answer all the questions of a degree is entitled to the privileges of that degree.

Nature Study for Our Children

By HERBERT J. STACK

Supervisor Secondary Schools, Johnstown, Pa.

WHAT can we do to bring nature study to the place it should hold in our public school education?

For a long time we have felt that health education should have a far more important place in the schools than it has previously occupied. It is only just recently that through organized courses of study and required time allotments health education has been able to take a real place in the curriculum. Shall we find the same difficulty in bringing nature study into the place which it richly deserves? Critics will be quite sure to complain that we are taking up too much time in new fads and fancies and getting away from the fundamental subjects. Just as if the so-called fads, health education, domestic science, the knowledge of nature and civics were not the real fundamental experiences that we wish our children to come in contact with. What we want is that the children through these newer subjects shall gain the command of the fundamental tools such as reading, writing, arithmetic and expression. In order to bring nature study into a functioning part in the elementary school program the following suggestions are made:

1. That the superintendents of schools either adopt the new state course of study in nature study or appoint committees to work out a nature study course of study for the first seven years.

2. That extension courses in nature study given by University or Normal School instructors be offered in the close proximity to the larger centers of population.

3. That regular courses be offered in all colleges and normal schools of the state in nature study and that all teachers who are going into elementary schools be required to take such subjects.

4. That County Institutes include on their program some of the best leaders in nature study work in the educational field.

5. That supervisors in the various school systems draw up plans and suggestions for seasonable work in nature.

6. That educational authorities encourage the use of various publications, books and magazines on this subject in their school libraries.

7. That teacher training classes and model schools be organized to show how such lessons can be conducted.

The fact that there are so few good textbooks on nature study available should not hamper us. As a matter of fact there are many most excellent books without the earmarks of the average school texts that are much better sources of material than a stereotyped textbook. The best nature study lessons will require no textbook but come out of the actual life experiences of pupil and teacher. It is only in this way that the rich valuable experiences of the race may be passed on to the children of the community who only too readily may pass through our schools knowing but little, observing but little of the wonderful world of living things in which they live.

Nature Games

By E. LAWRENCE PALMER
Professor of Rural Education, Cornell University

OF THE evidences in progress in work with children of elementary school age at least two of the more interesting leads have been taken by the work in nature study and by the work in supervised recreation. The work in nature study aimed to give the child the desired mental development through contacts with and interpretation of the natural environment. The work in supervised recreation aimed primarily to give the child the desired physical development through guiding his activities during time devoted to recreation. Of course there may be partisans of either of these two fields who may object to certain of the limitations suggested or implied. It is believed, however, that the aims stated are pertinent.

ATTIRE FOR A PAGEANT

Showing how the children may be dressed to represent harmful bugs.

Children do learn from their contacts with their natural environment and through their activities in time of recreation. Why can't a program be worked out which will, to some extent, unite these two in such a way that the recreation period will close with the child having, in addition to his physical exercise, some increased understanding of his natural environment? This increased understanding may have been gained through exercise in forming judgments and in applying to new situations interpretations which may have been pointed out in type situations. It may also have been gained in other ways not here mentioned.

Instead of treating this whole matter in the abstract, the writer submits the following set of original nature games which he has found useful in securing through the game spirit certain desired training for his students:

The Weed Rosette Game.—Children playing in vacant lots or open fields frequently no[t] on pads in made by the leaves of such weeds primrose, docks, teasel, mullein, plames so far the like. The story of why these pl[i]ples about such form particularly in the fall mo[st] remains be easily explained by this game. a number ning of the game depends upon mental uce a balcal superiority and upon originality. of power.

Ask each plat is true of lect about five life of a as stones or sle or small place them alon[g] a y be side of the field towards the sun. If the game is played in the morning, on the east side; and if in the afternoon, on the west. Then show the players three of the weeds whose rosettes are more or less common in the field. Explain that these rosettes have been formed by plants that wished to make the most of the sunshine of the year and, to prevent being destroyed by frost, had clustered their leaves close to the ground. If you can and wish, you might also point out other weeds that had not formed rosettes and had been destroyed by the frost because they had not sought safety in the rosette habit. The game is built about the struggle between the weeds, which desire to get wealth from the sun, and the frost, which interferes with them in this.

After you have shown the three weeds chosen to the children let them walk across the field, locating as many of the weeds as they can and finally lining up on the side of the field opposite that where the units of wealth (sticks or stones) were placed.

Select a good active individual who knows the weeds well to be Jack Frost, who is "it." He runs at will over the field, of course. At the start of

(1) what to do players dash across the field, atcare of the fire; oid being tagged by Jack Frost individual is give g him or by standing on one of the be able to ans r weeds chosen and naming it corsidered a re weeds secure safety from the frost by these questio rosette habit, and the players secure build fires ur Jack Frost by naming the weed. If gree; and tal player is tagged by Jack Frost in not only the e then assists Jack Frost in capturing are given t rs. To prevent individuals from being clan discu with the name of but one plant, insist they choos dividual can name the same plant twice the chiefta on. To prevent individuals from takthe five qu uch thus the et a mit of five or ten minutes for the game. Individuals who get across the field without being tagged by Jack Frost pick up a unit of wealth (stick or stone) and return, if possible, to the other side with it. The individual who, in the allotted time, can get the greatest number of units of wealth across the field before he is tagged of course wins the game.

THE GAME OF WATER-LIFE

This teaches the children much concerning the life in waters and ponds with which they are familiar.

A variation of this game may be played in winter, using the dead tops of weeds above the snow as safety zones, or it may be played with tree leaves as safety zones. Such variations are not so satisfactory from an educational standpoint because they do not teach anything fundamentally true about the plants chosen for safety.

Rabbit Race.—The rabbit race is an interpretation of rabbit tracks and rabbit movements, and if my readers have come to feel through the last three games that they are not getting enough physical exercise, they will feel differently when they finish this one.

All the players in this game should be asked to supply themselves with four large leaves or pieces of paper about the size of the sole of one's shoe. If necessary, pebbles may be folded into these to prevent them being blown away if the game is being played out of doors on a windy day. The players are all lined up in a common line so spaced that when they stand with their hands on their hips their elbows just miss touching each other. A greater distance than this might well be chosen if convenient.

Each individual is then asked to place one of the leaves or pieces of paper before him in such a manner that all the leaves make a straight line. He then places another about a foot further beyond, so that another line of markers is formed parallel to the first. The third is placed to the right of the other two in such a manner that an equilateral triangle is formed. The fourth is placed still further to the right a few inches from the third and forming the base of a Y made by the four.

The leaves or markers are now placed so that they represent the tracks of a rabbit. The first two markers represent the tracks made by the hind feet, the other two by the fore feet. The rabbit was, if running at a normal rate of speed, running from the players' right to left. The stunt is to see how quickly at the word "go" your players can place themselves facing as the rabbit was with their hind feet (feet) placed where the rabbit's hind feet were and their front feet (hands) placed where the rabbit's front feet were and facing in the direction the rabbit was facing when the tracks were made. The first to do this correctly is given the privilege of showing the others how the rabbit got from one track to the one in front. The correct position, of course, requires that the player faces the top of the Y and places his feet on the top of the Y. He then stoops down and places his hands back between his feet on the "tracks" behind. To get from one track to the other the player must put his hands down in their respective tracks ahead of him first, and then so jump that his feet will overreach his hands. It may be difficult to do this just once, but if the player continues going it will not be highly difficult unless he is too fat. If he feels that he is getting fat, playing rabbit in this way will help reduce very nicely. After all have learned how to run like a rabbit, you

may have a rabbit race in which, at the word "go," all run like rabbits across the finishing line 10 or 20 yards away.

The rabbit race may be varied by making it into a squirrel race, in which the hands are placed side by side instead of one behind the other, or into a cat race in which both hind and front feet move alternately. I once wrote up a dramatization of the sixth scout law in which the players dramatized certain animals through imitating their methods of locomotion. The characters were chosen by competition.

A rabbit or squirrel or cat relay race may be held as a modification of the above by dividing the group into two groups and having individuals race in turn between designated points in the manner of the animal chosen. The side completing their team first of course wins. Of course no player for a side may commence running until his immediate predecessor has crossed the finish line and has stood up (if he is still able to do so).

PRACTICING THE DRAGON-FLY NYMPH MOVEMENT

Note how the arms are flexed upward and outward to indicate a long-hinged lower jaw.

Another variation of this track work which is not so much a game may be welcomed after a strenuous race like that just suggested.

This requires that the group line up on a smooth road, beach or other piece of land, making a square not less than 15 feet on a side and preferably more. The players are uniformly distributed about the sides of the square. The instructor in charge tosses a nail or pointed stick into the center of the square and asks the player to whom the stick or nail points to tell a story of what he thinks a hypothetical rabbit did—such as, "The rabbit came slowly into the south side of the field and took four hops to the north." The instructor tosses the nail or stick again, and the individual to whom it points is to scratch on the ground with a stick what he thinks the tracks of the hypothetical rabbit would look like. He does this from the south side of the field as suggested. The stick or nail is tossed in again, and the selected player tells some more of the story, and another player similarly chosen writes it in the track language. All sorts of variations of this method may be made, using different animals and different rates of speed, creating dramatic situations and the like. It is best played on an open, sandy beach, though it may be played in the snow, on open ground, or even on the blackboard or on pads in the schoolroom.

The Game of Water-Life.—The games so far outlined have taught only small principles about individual factors of our environment. It remains for the game of water-life to show how a number of factors may be interlocking to produce a balance of power. What is true of the life of a puddle or small pond may be equally true of life on land in a broad sense. While the pond has some water plants in which feed and hide plant-eating may-fly nymphs, the dry land has fields of grass over which graze cattle, grasshoppers and other plant eaters. While in the pond these plant-eating may-fly nymphs may be destroyed by dragon-fly nymphs which catch them by means of their peculiarly hinged lower jaw, the cattle on land may be destroyed by man for food and the grasshoppers by birds for the same purpose. In either case, in water or on land, the vegation serves as food and shelter for the plant eaters. With this in mind, witness the game of water-life.

A square, level field is selected, preferably not less than 100 feet across, for fourteen players. One side of the field represents the top of the pond and the opposite side the bottom. In and scattered about through the field you may select for this number of players three large stones or other areas which may be christened vegetation and into which the players dramatizing may-fly nymphs may flee for shelter when pursued by their enemies. In each of these three areas place three players who, with three others at large in the field, will dramatize may-fly nymphs. Since most may-fly nymphs may be easily distinguished by the presence of three tail-like appendages and by the

presence of gills along the sides of the back part of the body, the players dramatizing these creatures run about holding three fingers of one hand behind them and fluttering the fingers of the other hand at the side of the belt.

At the "bottom of the pond" you may place the player who is to dramatize the dragon-fly nymph. Since this creature—the nymph, not the player—has a long, hinged lower jaw, the player dramatizing it runs about stretching and flexing one arm upward and before him.

At the "top of the pond" you may place a player who dramatizes some insect that feeds upon other insects and lives on the water surface. While whirligig beetles such as swim erratically on the surface probably do not destroy may-fly nymphs, they might be chosen to represent the preying creatures of that part of the pond. If you wish to be more technically correct, you might choose the diving beetles that so frequently come to the surface for their breath of air. If you decide to overlook details and choose the whirligig beetle because it is better known, let a player who wears glasses take this part, since whirligig beetles possess four eyes—two to see above and two to see below the water. The fore legs of both whirligig beetles and diving beetles move back and forth not greatly unlike the "breast stroke," so the player dramatizing these creatures should go through these motions when running about. By his movements he and all of the other players will be known.

When the game begins the whirligig beetle starts from the top, and the dragon-fly nymph from the bottom in pursuit of the may-fly nymphs in between. If either the dragon-fly nymph or the whirligig beetle tags a may-fly nymph, he yells either "dragon-fly" or "whirligig beetle," as the case may be. The may-fly nymph then knows that he has been "eaten" by his pursuer and must consequently take on the habits of his pursuer, just as the pig eaten by a man becomes a part of that man, though some have suggested that in some such cases the change is not great. At any rate, in the game a may-fly nymph tagged by a dragon-fly nymph becomes a dragon-fly nymph and helps capture other may-fly nymphs.

As the game progresses the director should enter the pond and remove "vegetation," freeing may-flies and making it possible eventually for all may-fly nymphs to have become either dragon-fly nymphs or whirligig beetles. When this has happened the dragon-fly nymphs are lined up on the bottom of the pond and the whirligig beetles on the top of the pond, and of course the group that has gained the greatest number of members wins. In the game, dragon-fly nymphs and whirligig beetles may not tag each other.

Natural Science and Nature Study in the Schools

THE following is the course of nature study advised by the Department of Applied Education of the General Federation of Women's Clubs, for Grade Three.

It can readily be adopted by a mother as a course in nature study for her children, or can be made the basis for study by any lover of nature.

GRADE THREE

Gardens:

Harvest crops.

Clean up garden.

Plant tulip bed.

Plant hyacinth bulbs in pots and trench them to bring in later in the winter.

Collect cherry pits, apple seeds and peach stones and save them for starting the seedlings in the winter term.

Bring in hyacinths for early spring bloom.

Grow sweet alyssum in window boxes, also sweet potato vines.

Start apple seed, cherry pits and peach stones in pots or cans of soil and rear the seedlings so they will be ready to set out as sizeable young plants by the last of April or early May.

Perennials.—Transplant young strawberry sets and care for the old plants.

Look after currant bushes.

Plant iris, hollyhock, larkspur and phlox seed.

Set out fruit seedlings.

Set bed of caladium and cannas.

Pets and Domestic Animals:

Guinea-pigs.—Third grade will have care of the guinea-pigs, white mice and rabbits but will study one each quarter. The object is to get children to assume responsibility for the care of living things, to realize the necessity for cleanliness and regular habits, to observe their behavior.

If these and the other animals to be studied this year can be bred in the school, the offspring may be given to the children to start home pens from which they may learn much.

White Mice.—Care for a cage of white mice or rats. Get some of the waltzing mice if possible. With proper care the mice will probably breed in confinement. Obtain some bulletins on the rat as a pest. Let the teacher select some of the striking paragraphs to be read.

Rabbits.—Care for a pen of rabbits. Have specimens, if possible, of several of the breeds, Angoras, Belgian hares, curly Dutch, etc. At least see pictures of the various breeds.

Toys and Home Appliances:

Let children make bows and arrows to get acquainted at first hand with elasticity of objects. Make a small gun with elastic band so as to shoot small arrows like partly burned matches.

Elasticity of rubber ball; how far does it rebound from a height of four feet on floor or cement pavement? When thrown against a wall at what angle does it rebound?

(Angle of incidence equals angle of reflection.)

Why sled goes faster on a steep hill? Does it go farther when there are two boys on it or when there is only one?

Make pop-gun.

Make leather sucker to lift objects.

Use siphon.

Make squirt gun. Why it works.

Roll hoops to get idea of driving force and momentum—once going they stay in motion for some time. Use ball and bat for same idea. Call attention again to elasticity of ball. Why are golf balls made of rubber? Note transfer of energy from bat to ball. Use marbles to show same thing. Are marbles elastic?

Correlated Materials:

Insects of the Garden.—Life history of cabbageworm, tomato worm, squash bug, plant louse, lady beetle, potato beetle.

Mouth parts and eating of bug and beetle.

Silk worm and Cecropia.

Continue records of the weather.

Star Constellations.—Orion, Canis major, the bull, ram, Gemini, Leo, Virgin, archer, scorpion, Southern fish, ship, Eridanus. Legends connected with them.

See hills, plains, river valley, flood plain, peninsula, eroding action of water. Visit quarry, gravel pit. Collect fossils.

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Nasturtium — *Giant Dwarf Mixed*
Phlox Drummondi — *Finest Tall Mixed*
Salpiglossis — *Brown with Gold*
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Cucumber—*White Spine*
Lettuce—*Black Seeded Simpson*
Lettuce—*May King*
Onion—*White Portugal*
Parsley—*Curled*
Peas—*Little Gem*
Radish—*Scarlet Globe*
Radish—*White Icicle*
Spinach—*New Zealand*
Swiss Chard—*Giant Lucullus*
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A Cyclopean Delicacy

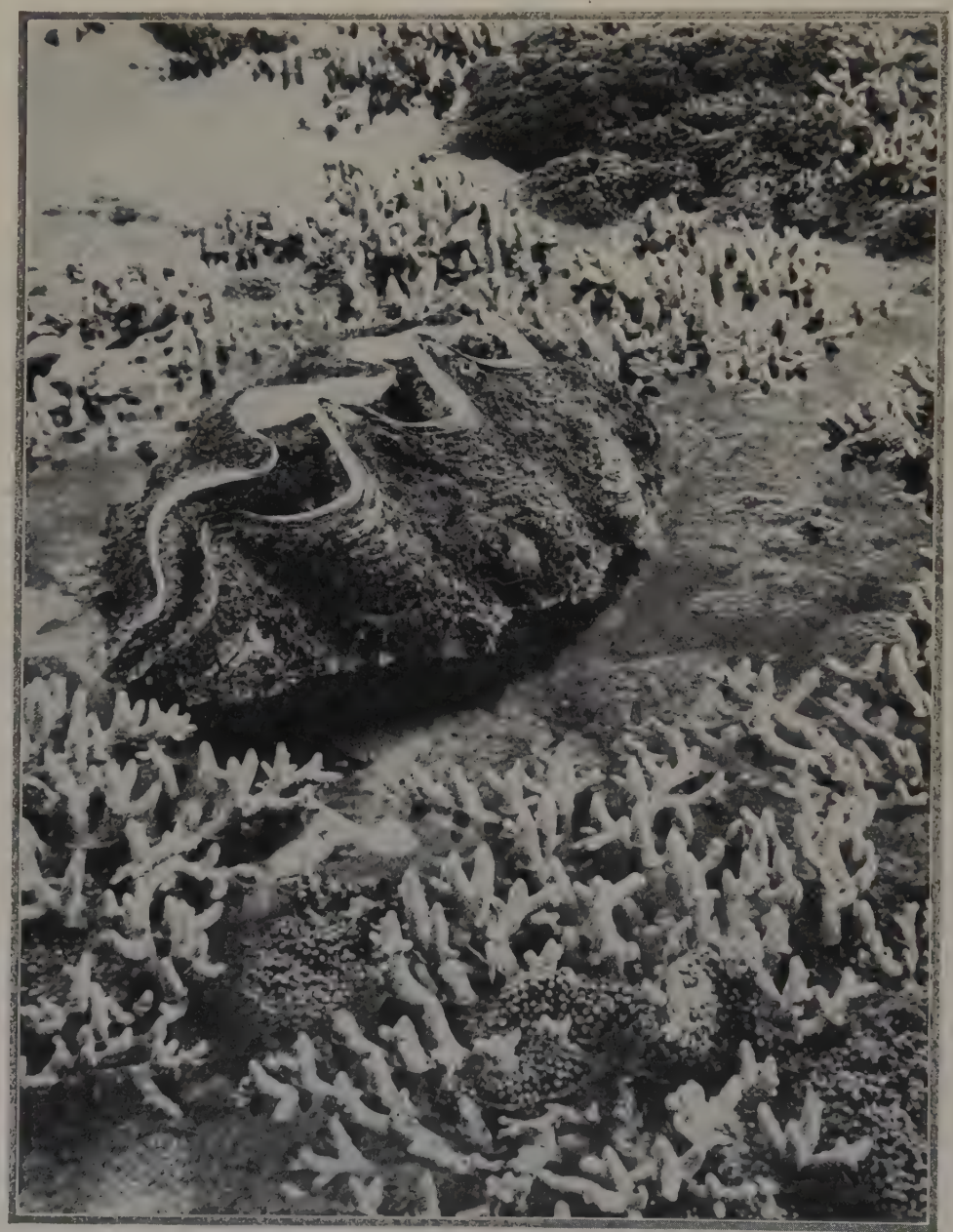
IMAGINE the giant Cyclops scanning the Gargantuan menu with his solitary eye. He lights upon the item: "Tridacnas on the Half Shell, with Cocktail Sauce." Ah, a dish for the great of stature!

"Bring me that," he orders.

Soon the delicacy is carried in to the waiting giant. On a plate as large as the big dining-room table, resting temptingly on 50-pound cakes of ice, lie the usual six shellfish. In the center is a large bucketful of cocktail sauce. A three-pronged pitchfork is placed beside Cyclops' plate. He smacks his lips as he spears the luscious shellfish seasoned with a shovelful of horse radish—dips it in the bucket of sauce, and lets it slip down his Brobdingnagian throat.

Although this may seem to stretch the imagination, this is no Munchausen story. Gulliver might have written it in his tale of his strange travels in the land of the giants. In the tropical waters of the western Pacific Ocean are found giant clams that might very well have graced the tables of the first families of that mythical land. We mortals of ordinary stature find clams or oysters on the half-shell a tempting delicacy with which to start our dinner. One, properly dipped in the little glass of sauce, can be swallowed with a single gulp. But they have big brothers and sisters, known by no other name than that of Tridacnas.

These tremendous fellows weigh often more than 300 or 400 pounds. There is one of these in the United States National Museum in Washington that tips the scales at 302 pounds. Their edible parts may weigh as much as 20 pounds—truly a fit delicacy for a Cyclops.

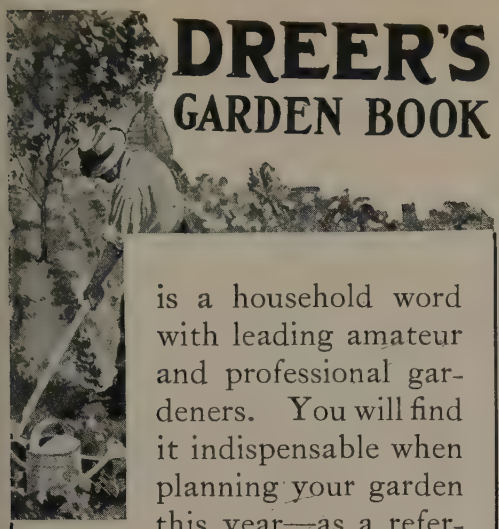


A GIGANTIC CLAM Copyright by Capt. Frank Hurley

These giants are marvelous creatures. Some weigh several hundred pounds. This one is embedded in the coral, having just enough space to allow the shell to open so it can get food.

Similar to most of the members of the family known to scientists as bivalve mollusks, our giant Tridacna swims about in a soft, jelly-fish-like state for varying periods. Finally he selects a place to settle down in for life. In this one spot he proceeds with his development, building and hardening his shelly overcoat.

The oyster, when it comes to rest, attaches itself by one side. Not so the Tridacna. He rests on his



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back, hitching himself to a permanent mooring along the line which hinges his two great coverings of shell. He likes a bed of surrounding coral. He luxuriates there, demanding only room enough in which to open and close his shell and gather in his food. Once settled in a home-like and satisfying spot, he is like many humans—there for his life time.

The passing water brings the Tridacna his meals. Like the rest of his smaller relations in the mollusk family, he lives on the unseen life swimming free in the water of the sea. Scientists call this molluskan fare "plankton," and it is the central item on the Tridacna's menu. Through his gills he strains the water and picks out the morsels for his diet.

Alive this immense brother of the clam and oyster is beautiful in many ways. Lying amid the white shoots and spears of a staghorn coral reef, the softer, inner portions of the Tridacna give contrast through their peacock color. It resembles a colorful sea worm found frequently in tropical waters as well.

If the explorer is anxious to discover whether it is a sea worm or the Tridacna at meal time that he sees in the bed of the coral, he would better investigate with a long stick. A prod and the Tridacna will withdraw into his shell and clamp the scalloped edges of his shell together. A foot, incautiously used to prod the fellow, might be permanently and fatally clamped between the long jaw of his shell. Divers, not knowing of the presence of the giant clam, have lost their lives by stepping into his open mouth and remaining there with 400 pounds of Tridacna firmly attached to them.

Having the iridescent beauty of oyster and clam shells, the interior of the Tridacna's home is extremely beautiful. The half shell is frequently used as a baptismal font for churches. No doubt, also, the children of our friend Cyclops or the young people of Brobdingnag would find them pretty playthings for the beach.

Trees and How to Plant Them

(Continued from page 165)

of individual judgment governed by the shape of the tree.

Recently it has become popular in some sections of the country to plant nut trees along the roadside. Many of these trees are very beautiful and at the same time profitable. In Europe fruit trees are found along miles of highway, sources of profit to the political subdivision in which they are found. Both fruit and nut trees lend themselves admirably to memorial park planting and the making of community groves.

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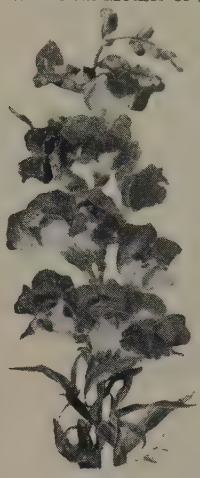

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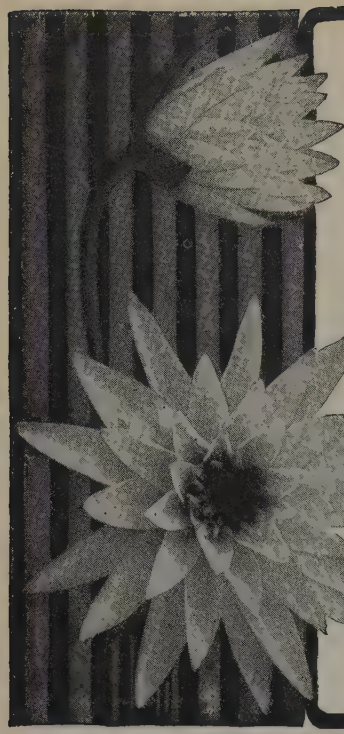

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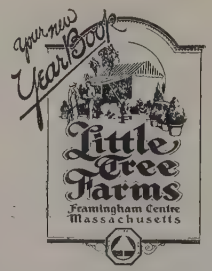

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New **Minstrel Shows,** Musical Comedies, and Revues, suitable for high school and college presentation.

pleasure of planting a tree. The American Tree Association of Washington, D. C., will send any one tree-planting suggestions and a tree-day program. The Association is registering these tree planters, giving them a certificate of "good citizenship" as members of an army that realizes the significance of what Theodore Roosevelt meant when he said, "a people without children would face a hopeless future; a country without trees is almost as helpless."

Sugartime in the Maple Lot

(Continued from page 163)

stirred into cakes or poured into pails or tubs for bulk shipment.

The night's work is nearly done. The family is looking forward to a treat. Some syrup is boiled until it will "wax." It is poured on snow or ice, spreading out into brittle sheets. Contrive as he may, the manufacturer of candies can make nothing more delicious than this delicacy which the family sits down to eat with pickles or doughnuts.

One day the buckets will yield a darker sap which makes a reddish syrup. It is Nature's signal of the end of the season. This is a warning that the buds of the tree are beginning to swell, taking their strength from the soil. The changing point of the year has come. Where the snow was waist deep Hepaticas bloom among the tree's roots. The robins sing and the frogs pipe. The sugar maker calls the darker-flow "buddy sap" or "the frog run." Only by extra effort at cleanliness, and frequent collection and quick boiling, can he make this into syrup and sugar. The sugar season is over and in a few weeks the maple tree will again be at work storing up for another year.

While the art and industry of making maple syrup and sugar have their interesting and even romantic sides, there are problems as well. The equivalent of about forty-five million pounds of maple sugar are made in the United States each year. This is the yield of about eighteen million trees.

The chief problem is economic. The maple products are made by the farmer with the help of his family, and perhaps two or three hands. He cannot maintain a store in the city. The cost of labor and equipment forbid a series of profits, or even one extra profit, between the producer and consumer. Cooperative marketing and original personal methods of selling by mail are the two main methods offered.

When it comes to the cooperative effort, another problem arises. In Vermont, for example, there are about 10,000 sugar makers. The sap they make the sugar from is practically the same. The product is not. Some are more skilled or more mindful of the traditions of their fathers and grandfathers in this industry. Others lack the skill or the inclination to make the sweet products as finely as they must be made. A cooperative organization, then, must grade and market the output, which means ex-

pense. Some producers with high pride in their product and above the average business ability prefer to sell their syrup and sugar themselves. They then compete with whatever cooperative group there may be.

Individual selling has come more into vogue recently. One maple sugar maker has put up his product into an enticing little wooden box. It is made like a book. On the outside it is titled, "The Story of Maple Sugar." Inside the buyer finds a half dozen sweet cakes of sugar—an interesting story with a happy ending. Another maker packs his products in attractive birch bark boxes.

In the matter of advertising and competition, the maker of real maple products must pit his pure syrup, made in the snows and near the trees from which it comes, against concoctions that never saw a sap bucket but got their flavor from hickory bark extract. Furthermore, many grocers find it more profitable to sell the "near" product instead of the real thing.

There are millions of maple trees in Vermont and other states that have never been tapped. If conditions allowed they could turn out much more than the one tiny cake that could be distributed to everyone in the United States if all the sap now drawn were made into sugar. As it is, the farmer often finds it more profitable to sell his maple-lot to the lumberman. But in some of the maple groves of Vermont there are venerable trees which have given sap for two centuries. They are the symbols of an interesting industry that Nature has made possible, and they belong to posterity.

The Marauding Moth Miller

(Continued from page 160)

a chemistry experiment he had performed.

"Yes, but the odor goes away quickly and it certainly gets rid of the moth. I'll admit that what they call carbon tetrachlorid has a much nicer odor, but it is not half as effective. When people can, they often use dry heat, and the sun is a pretty good fumigator of clothes with moths in them. Hot water is good, too, if it won't hurt the cloth and laundry soap is good.

"It is funny how many things people think will get rid of the moth. I've had lavender flowers, cayenne pepper, salt, lime, black pepper, tobacco extracts, allspice, red cedar leaves, eucalyptus leaves and a lot of powders and acids suggested to me, and I find out that they are all worth nothing at all. Cedar chips and shavings aren't worth a great deal, and gasoline, while it kills moths, is not much lasting good.

"So, if you all will be careful not to put woolen and fur things away in places without telling me that will help a lot. Just keep your eyes open for the little white eggs, about the size of the head of a pin, or for the worm at work building his case, or his silk subways. And when you see a miller flying about, just try and catch him."

There was a resounding whack as father brought his hands together in mid-air. "Got him," he announced triumphantly.

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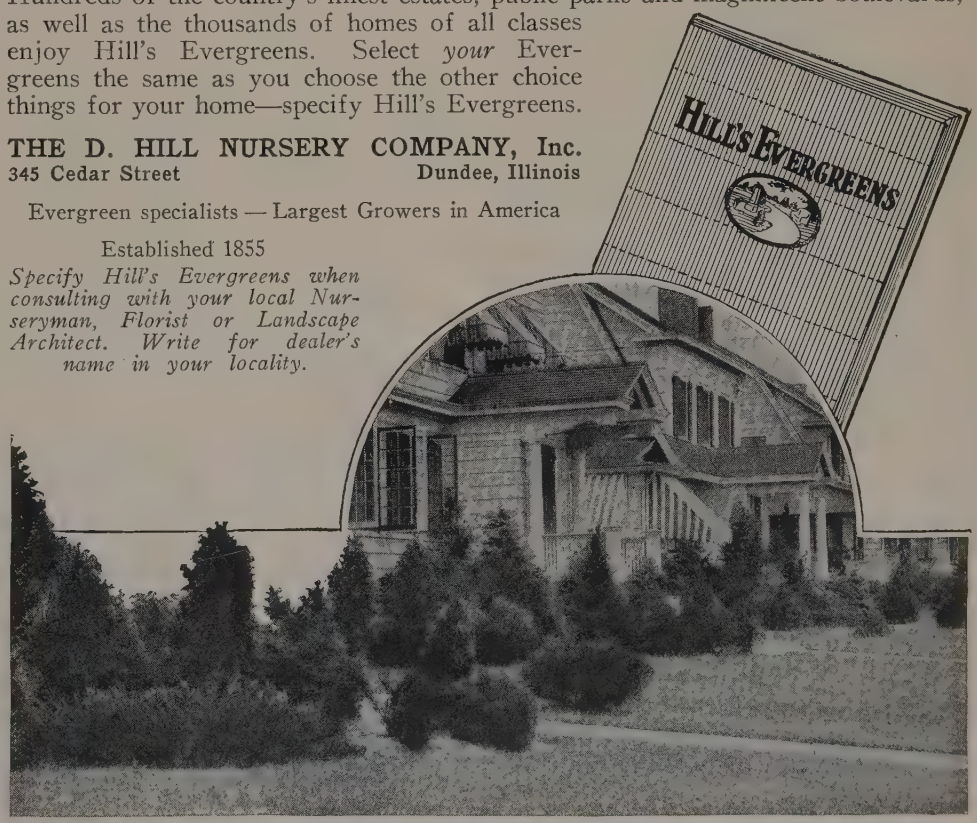

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23

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From Boll to Bolt

(Continued from page 146)

The future of our American cotton crop depends, of course, upon the demand in foreign markets. With the world upset today by the aftermath of war and the brewing of more strife, these markets are of diminished value. In the interests of our cotton growing industry, as well as others of our crops, the United States can and should contribute its influence to the task of bringing order to Europe. The stake is an economic one, as well as human and social. Just as the boll weevil creates an international problem in production, so does the plight of Europe affect us economically.

Just the importance of bringing economic security into the industry of growing and marketing this great gift of Nature can be gauged by its vital part in our lives. Beyond its use for textiles, cotton goes into many articles of every day use. When you load your camera you are using cotton. Your automobile top is very likely made from it. The seats may be covered with cotton in the form of artificial leather. The linters that cling to the seed go into celluloid. Cotton is used in balloons, and is now favored over linen for airplane wings. Imitation ivory comes from cotton. The earpiece and mouthpiece of your telephone are responsible to cotton, and the wire leading to the instrument is covered with cotton fiber. The seed is made into cotton seed oil and soaps. The residue is compressed into cakes and makes fertilizer. Artificial silk, made from cotton, is becoming a necessity instead of a luxury.

From the cotton gin, separating the lint from the seeds, to the store shelf, the bale passes through a multitude of fascinating processes. Great machines clean it, comb it, draw it into thread and yarn and weave it into fabrics. The simple spinning wheel of our ancestors stands at one end of this wonderful development, and the giant mills of today at the other. Through them mankind has taken the natural gift of the soil to make things of beauty and utility, to adorn Fifth Avenue and the upper reaches of countries we choose to call less civilized than our own.

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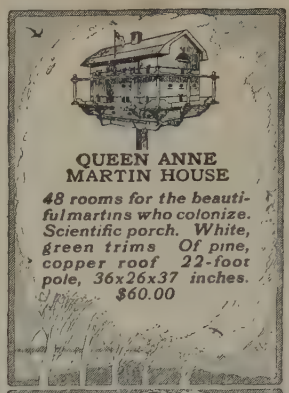

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Nature News and Views

A Snake Dinner

As one field mouse may kill ten trees a year, and a single snake will eat 150 mice in a season, is not one snake worth 1,500 trees? On January 24 the Reptile Study Society of America held its annual dinner in New York, sounding once more the keynote of its policy and definite aim, "Protect the snakes." We have all been taught to respect the wise old owl as the sworn enemy of rats, mice and other rodents which do such tremendous damage to our trees and crops. The snake is equally with the owl the friend of mankind.

Many members of the Reptile Society brought their pet snakes to the dinner, but not one ounce of "snake-bite medicine" was drunk. Why? Because most snakes are absolutely harmless to man! The true lover of nature never kills a snake unless he positively knows that it is poisonous. Even then he often forbears.

The Bear and the Bars

"Poor old bear, I bet he'd like to be let out of that cage." Have you sometimes overheard that remark passed by some visitor to the zoo? Early in December the order was given that "Brownie" and "Billie," the two caged bears at the Yosemite, should be set free. As soon as the bars were removed, "Brownie," the little female, lost no time in saying farewell to her erstwhile home and started off in leaps and bounds for the nearby forest. Not so "Billie." For three days he refused to pass the open door beyond which, perhaps, something told him that he would have to begin working for his living. Finally, one morning, he was lured outside and the door slammed behind him, but even then he returned in the evening, whining and clawing at the bars. A resident near the zoo declares that "Billie" returns each night and feeds from a garbage can that stands very close to the old bear den.

A Growing Park

Addition of 600,000 acres of land now belonging to the United States Forest Service to the area of the Roosevelt-Sequoia National Park and rectification of the boundaries of the park is provided in a bill now before Congress. The measure has the support of the Forest Service and the National Park Service. The chief opposition comes from irrigation and water power interests, who present a claim that the change will prevent future development in annexed territory. The section in question is felt by Government officials to be impracticable of commercial use.

A Prize Idea

Charles Lathrop Pack, president of the American Tree Association, has now established Pack prizes in six forestry schools, where they will be devoted to reward the student forester who develops the most outstanding ability in "selling" forestry to the public. The prizes, which are the annual income from a five per cent $1,000 bond, have now been established in the New York State College of Forestry at Syracuse University; the Forestry College at Cornell University; The School of Forestry at Washington University, Seattle; the Forestry School of the University of California, Berkeley; the Pennsylvania State College, State College, Pennsylvania, and the Forestry School, University of Michigan, Ann Arbor.

Capitol Verse

The following quatrain is said to be of congressional origin and dedicated to the select Committee on Reforestation of the United States Senate:

In planning out the strategy
Of this great sylvan battle,
We each shook hands with every tree
From Bangor to Seattle.

Music Hath Charms

An article appearing in NATURE MAGAZINE regarding the effect of music upon snakes has inspired several enthusiastic members to a discussion of animals and music. A friend tells us that her cat—usually indifferent to the music of a phonograph, or at least acting upon the assumption that distance from the whirring record lent enchantment to the sound—developed a strange liking for Schubert's "Ave Maria" as played by Heifetz, and would invariably take up her place as close as possible to the machine whenever that record was played. Cat lovers will undoubtedly wish to try this experiment on their own pets, while those indisposed to the feline species will nevertheless be glad to note this improvement in pussy's musical taste.

Do Insects Talk?

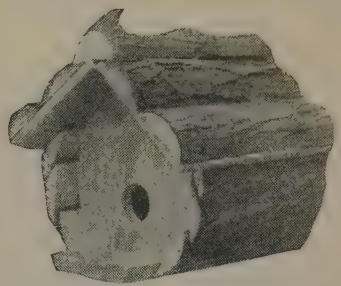
The recent invention by Dr. Phillips Thomas of a new supersensitive microphone has re-opened the question as to whether insects talk. This new device is capable of picking up sounds beyond the range of the human ear and, as soon as it can be made available to science, may succeed in establishing the fact that certain birds, animals and insects are able to communicate with each other by means of sounds too high in pitch for ordinary audibility.

For Transfer of Land

Addition of 600,000 acres of land now belonging to the United States Forest Service to the area of the Roosevelt-Sequoia National Park and rectification of the boundaries of the Park is provided in a bill now before Congress. The measure has the support of the Forest Service and the National Park Service. The chief opposition comes from irrigation and water power interests, who present a claim that the change will prevent future development in annexed territory. The section in question is felt by government officials to be impracticable of commercial use.

The Beech

"There is no finer sight than an ancient beech woods, or even a single tree, for it has almost the ruggedness of the oak, and a more graceful beauty withal," says Prof. Edward Wilber Berry in his book, "Tree Ancestors," published by Williams & Wilkins Company. "Its smooth, light-colored bark fits like a glove, and from time immemorial in regions where there were lads and lassies the boles have been carved with initials, impaled hearts, and lovers' knots. The roots have a habit of spreading near the surface of the ground so that they show, especially on slopes where the shaded ground is subject to wash."



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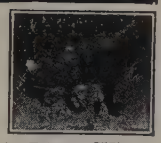

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Senator Sounds Call

"Our forests and our timber supply constitute the most widespread of all the economic problems likely to confront this country in this generation," declared Senator George H. Moses, of New Hampshire, in an address at the annual meeting and dinner of the American Forestry Association, in New York, on January 23. In urging the people to support the McNary-Clarke Bill drafted by the select Senate committee of which he is a member, Senator Moses asserted that the time has come when it is the duty of the people of the United States to see that Congress establishes a definite forest policy. Col. Henry S. Graves, provost of Yale University, was reelected president of the Association.

The Sparrow in the Spotlight

The corner of Sixth Avenue and 42nd Street, New York, is illuminated at night by one of the brightest electric signs in the city. Directly across the street, about 125 feet away and on the corner of Bryant Park, stands a tree in which about 500 English sparrows go to roost every evening. They are virtually roosting in the daylight, inasmuch as the bright light from the sign gives much the same effect.

Again the Power of Growth

One of our fellow members gives us the following interesting story. "I was very much interested in the article entitled, 'The Power of Growth' by Mr. Edwin D. Snyder, as we, down at our quarry, have a very good example of it. There is a white oak tree there that has grown on an old scrap pile left by the old quarry company before the time of George Washington. We are told that it would take about ten years for enough soil to settle on this pile of rock to allow the seed of an oak to germinate. We cut this tree down and it had approximately two hundred rings. The roots in some places had pried their way through solid rock."

Extension Course on Trees

Hugh Findlay, assistant professor of agriculture at Columbia University, is giving a university extension course on native trees, their selection, planting, and care. Such activities as this are highly valuable as an introduction to our forestry problems, particularly so in this case, because these courses reach the average citizen seeking knowledge rather than the man or woman preparing for a definite profession.

Does Your Child Ever Embarrass You?

What is so embarrassing, so humiliating, as a naughty child. Every mother knows that people judge her by the behavior of her children—that parents with unruly youngsters are seldom popular. Yet all this trouble and humiliation is now unnecessary, for now there is a scientific method of child training, evolved by Professor Ray C. Beery, A. B., M. A. (Harvard and Columbia and president of the Parents Association). This new system shows you how to correct *the cause* of disobedience, wilfulness, untruthfulness and other dangerous habits in children of every age.

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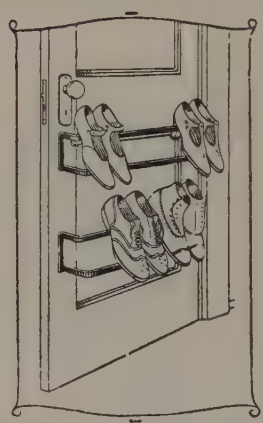

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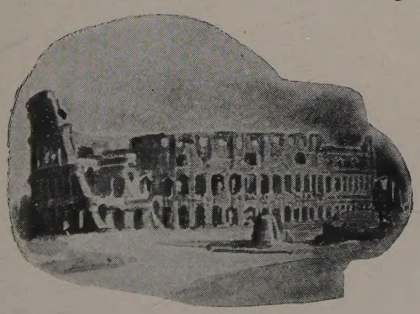

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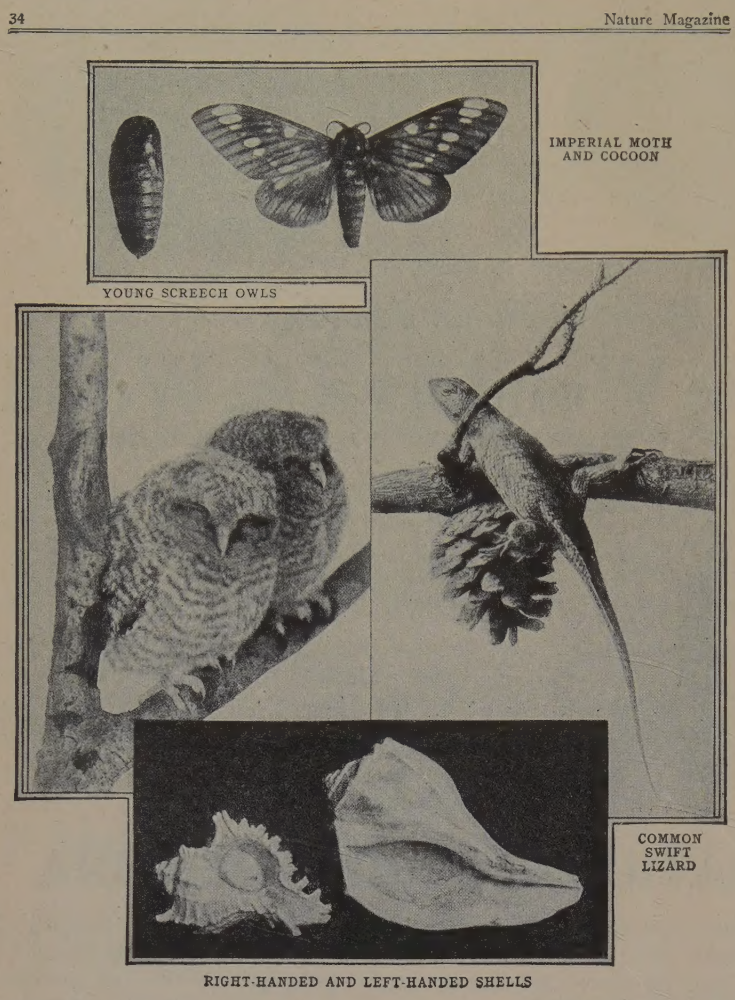

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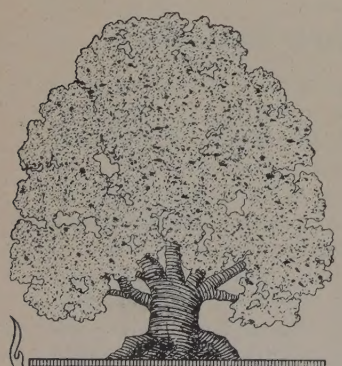

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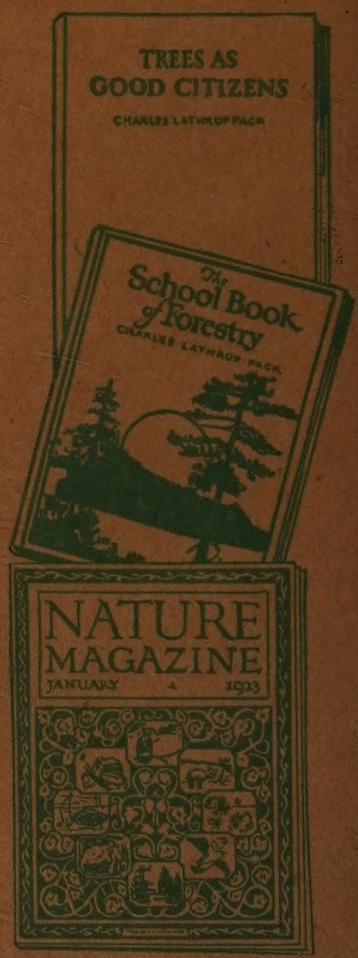

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